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Journal OF PRIMARY HEALTH CARE

'New Zealanders could improve their cardiovascular health with the stroke of a (butter) knife.'

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An eclectic issue

Felicity Goodyear-Smith MBChB, MGP, FRNZCGP, Editor

While New Zealand adopted information technology (IT) early, too often we have retained our data in silos and failed to harvest their potential value. Finally we are reaping the benefits, and have entered the era of data integration. In one of this issue's two lead papers, Thornley and colleagues combined national datasets of drug dispensing, outpatient attendance, laboratory tests and hospital diagnoses with primary care based data to estimate the prevalence of diagnosed diabetes.¹ In his guest editorial, Emeritus Professor Mike Pringle acknowledges the value of these complex data-matching methods but awaits the day when they are superseded by the a sole clinical record which he says will inevitably reside in general practice.²

Our other lead paper is a small randomised controlled trial with promising results. The researchers looked at using community-based group games to promote increased regular physical activity in Pacific adults compared with no organised activities.³ As our other commentator Professor Martin Dawes points out, our patients will only take up and maintain physical activities that they like to do.⁴ For Pacific patients this may be engaging in informal 'small-sided' team sports rather than individualised exercise such as running, cycling or working out at the gym.

Back to Back addresses the issue as to whether saturated fats are really the villain we have come to believe. Petousis-Harris presents evidence that saturated fat intake is not associated with cardiovascular disease events or deaths, and moreover that replacement of saturated fats with carbohydrate (low-fat options may have a significantly higher sugar content than conventional products) probably increases heart disease and contributes to the development of metabolic syndrome. There is evidence to support the use of polyunsaturated fat (from food such as nuts) over saturated but

not monounsaturated fats. In other words, butter is not so bad!⁵ Skeaf and Jackson beg to differ.⁶ They argue that a causal relationship between saturated fat consumption and heart disease is undeniable and that we should wipe butter from our diet. Read the articles, consider the evidence and decide for yourselves whether it is better not to eat butter.

New Zealand general practices can give themselves a pat on the back. Research by Turner et al. shows significant improvements in managing the cold chain for national schedule vaccines.⁷ This has resulted in less wastage and equates to an estimated health dollar saving of nearly \$NZ4 million a year. Increasing Vote Health income through taxes can also produce health gains. A study shows that following the 2010 increase in tobacco tax, there were more smokers making an attempt to stop and more smokers identified cost as a motive for quitting.⁸

A number of this issue's original scientific papers report on specific primary care innovations. There is evaluation of a Pacific immersion programme whereby University of Otago medical students spend a weekend with a local Pacific family to experience Pacific life and learn about factors that influence the health of Pacific peoples.⁹ McMenamin and colleagues report that a colour-coded Dashboard introduced into the electronic medical record by a Primary Health Organisation increased the meeting of key performance targets by practices.¹⁰ A further paper discusses nurses' perceptions around their running healthy lifestyle clinics which target Maori, Pacific and people living in high deprivation areas.¹¹ The views of GP clinical teachers are canvassed on what they consider would assist them in this role.¹²

In our *Ethics* column, Northland GP Stephen Main describes two personal end-of-life expe-

CORRESPONDENCE TO:

Felicity Goodyear-Smith
Professor and Goodfellow Postgraduate Chair, Department of General Practice and Primary Health Care, The University of Auckland, PB 92019 Auckland, New Zealand
f.goodyear-smith@auckland.ac.nz

riences.¹³ One had a 'good death'. The other suffered a slow, painful death in which he argues the ethical principles of autonomy, beneficence and non-maleficence were violated, even though her professional carers would have believed they were doing their best for her. Treatments that prolong life may also prolong suffering. When is it acceptable to withhold these?

In *Pounamu*, Maori GP Lance O'Sullivan describes the recently launched throat-swabbing programme aimed at eliminating rheumatic fever in Te Tai Tokerau,¹⁴ and *Vaikoloa* outlines the Pacific version of Whanau Ora, the holistic model of care O Le Aiga ma le Fanau ia Ola developed by Alliance+.¹⁵

For busy GPs, our regular columns supply distilled evidence. This issue's *String of PEARLS* summarises six Cochrane reviews about myocardial infarction, and *Cochrane Corner* indicates that pronating rather than supinating the forearm might be more successful in reducing subluxation of the radial head in a child. *Potion or Poison?* points out that while topical aloe vera might sometimes be beneficial in skin conditions, there is no place for its oral use, and our *Nuggets of Knowledge* column indicates that gout sufferers may be receiving suboptimal doses of allopurinol and it is safe to use serum uric acid concentrations, not renal function, to monitor up-titration.

We reproduce a short article to let all doctors and other health professionals know that about 140 000 lives could be saved globally every year if trauma patients with significant bleeding were treated with tranexamic acid within three hours of injury.¹⁶ Lastly we round off the issue with our *Letters to the Editor*. Correspondence from the United Arab Emirates relates to a study published last issue¹⁷ and indicates that the Journal is attracting international readership.¹⁸

Clearly this December issue is an eclectic mix. However, some themed issues are planned for 2012. The June issue will be featuring a number of articles relating to evidence-based practice and in September the issue largely will be devoted to transdisciplinary collaboration/cooperation. The call for papers is now out for studies on inter-

professional education and practice. These might be about shared care, clinical pathways, integrated health centres, primary care IT initiatives and increasing intersectoral collaboration. We plan to finish 2012 with a Christmas issue featuring articles and studies that are funny, quirky or satirical in nature. Please consider taking these opportunities to submit your work to the *Journal of Primary Health Care*.

References

- Thornley S, Wright C, Marshall R, et al. Can the prevalence of diagnosed diabetes be estimated from linked national health records? The validity of a method applied in New Zealand. *J Prim Health Care*. 2011;3(4):262–8.
- Pringle M. Understanding the prevalence of long-term conditions. *J Prim Health Care*. 2011;3(4):260.
- Biddle M, Vincent G, McCambridge A, et al. Randomised controlled trial of informal team sports for cardiorespiratory fitness and health benefit in Pacific adults. *J Prim Health Care*. 2011;3(4):269–77.
- Dawes M. I suggest you take up some exercise like running. *J Prim Health Care*. 2011;3(4):261.
- Petousis-Harris H. Saturated fat has been unfairly demonised—the 'yes' case. *J Prim Health Care*. 2011;3(4):317–9.
- Skeaff M, Jackson R. Saturated fat has been unfairly demonised—the 'no' case. *J Prim Health Care*. 2011;3(4):320–1.
- Turner N, Laws A, Roberts L. Assessing the effectiveness of cold chain management for childhood vaccines. *J Prim Health Care*. 2011;3(4):278–82.
- MacFarlane K, Paynter J, Youdan B. Tax as a motivating factor to make a quit attempt from smoking: a study before and after the April 2010 tax increase. *J Prim Health Care*. 2011;3(4):283–8.
- Sopoaga F. A Pacific immersion programme—is it useful in teaching Pacific health to future doctors in New Zealand? *J Prim Health Care*. 2011;3(4):311–16.
- McMenamin J, Nicholson R, Leech K. Patient Dashboard: the use of a colour-coded computerised clinical reminder in Whanganui regional general practices. *J Prim Health Care*. 2011;3(4):307–310.
- Marshall B, Floyd S, Forrest R. Nurses' perceptions of nurse-led healthy lifestyle clinics. *J Prim Health Care*. 2011;3(4):289–97.
- Hawken S, Henning M, Pinnock R, Shulruf B, Bagg W. Clinical teachers working in primary care: what would they like changed in the medical school? *J Prim Health Care*. 2011;3(4):298–306.
- Main S. A tale of two deaths. *J Prim Health Care*. 2011;3(4):329–30.
- O'Sullivan L, e Runanga o Te Rarawa Rheumatic Fever Reduction Programme—Kaitaia. *J Prim Health Care*. 2011;3(4):325–6.
- Mariner T. Alliance Health+ Trust. *J Prim Health Care*. 2011;3(4):327–8.
- Roberts I. Tranexamic acid—a recipe for saving lives in traumatic bleeding. *J Prim Health Care*. 2011;3(4):331.
- Reti S, Feldman H, Safran C. Online access and literacy in Maori New Zealanders with diabetes. *J Prim Health Care*. 2011;3(3):190–1.
- Hashim M. Access-literacy gap in online health education for diabetes—Internet access is just one link. *J Prim Health Care*. 2011;3(4):333.

Understanding the prevalence of long-term conditions

Mike Pringle MD FRCGP
Emeritus Professor
of General Practice,
University of Nottingham,
United Kingdom

Everybody from the individual general practitioner to the Minister for Health has an interest in knowing the prevalence of major medical conditions. A practice cannot understand how well it detects disease without looking at both prevalence and incidence data; nor audit its care without knowing whose records to examine. Commissioners of services need to understand the need for those services. Planners and policy makers need to be able to monitor health needs and population health.

Prevalence is, therefore, everybody's business. Although some tolerance in the precision of prevalence estimations is acceptable, they need to be sufficiently robust to allow for effective decision making.

medical conditions that will influence their operative risks, post-operative care and pace of recovery. By understanding the rates of these we will be able to model the types of care to commission a decade ahead.

If the recording of major diagnoses and their associated risks in the general practice record could be complete, accurate and electronic, then the problem would be solved. However, 2008 unpublished data in PRIMIS+ (a unit of the University of Nottingham funded by the NHS to promote data quality in general practice) shows that, for the 3181 general practices uploading data quality audits on multiple occasions, 90.4% of all disease-specific drugs (in 27 drug-diagnosis pairs) had an appropriate diagnosis in the records.

If we are to plan ahead, we need good historical trend data in common disease prevalence and the ability to project forward, based on expected changes in demographics and life expectancy...

Yet prevalence rates alone are not enough. If we are to plan ahead, we need good historical trend data in common disease prevalence and the ability to project forward, based on expected changes in demographics and life expectancy. We also need to understand comorbidity. Diabetes is an important condition in itself, but it is also associated with many of the important conditions of our time—obesity, ischaemic heart disease, renal failure, retinopathy, neurological problems and so on.

It is not only those comorbidities that naturally cluster that interest us. For example, people who require a hip replacement will also have major

This level of recording is strikingly similar to that found by Thornley et al.¹ They have shown that using other data sources such as community prescriptions, hospital attendances and investigations improves the accuracy of prevalence estimates. These complex methods will remain valuable until one clinical record—inevitably that in general practice—becomes sufficiently high quality and available to be relied on alone.

References

1. Thornley S, Wright C, Marshall R, et al. Can the prevalence of diagnosed diabetes be estimated from linked national health records? The validity of a method applied in New Zealand. J Prim Health Care. 2011;3(4):262–268.

CORRESPONDENCE TO:
Mike Pringle
mikepringle@btinternet.com

I suggest you take up some exercise like running

Running—what a terrible association that one word often produces in a lot of people. It can conjure up ill-fitting gym shoes, horizontal cold rain, painful hills, and an altogether unpleasant childhood experience. However, discussion of group sports such as football, cricket, and other team sports may produce more pleasant memories. While many of us like to run (I readily confess to my addiction) or undertake other more solitary sports, others prefer the social contact of group sports.

In 1979, evidence from the Framingham Study demonstrated that overall mortality and mortality due to cardiovascular and ischaemic heart diseases were inversely related to the level of physical activity for men.¹ Over the subsequent years, more evidence has been accumulated showing that increasing activity helps you live longer; however, the evidence base for this is startlingly low in comparison with pharmaceutical interventions. “The primary limitation of much of the data linking physical activity to morbidity and mortality due to chronic diseases is that for many conditions few randomized trials of adequate design have been conducted.”² For some life-threatening diseases we do have more evidence. In 2010 a European multidisciplinary consortium reviewed the evidence on effectiveness of screening and interventions for Type 2 diabetes prevention. Interventions supporting lifestyle changes delay diabetes onset in high-risk adults (NNT: 6.4 over 1.8 to 4.6 years). They suggest that these should be supported by intersectoral strategies that create “health-promoting environments”. The population approach should use organised measures to raise awareness and change lifestyle with specific approaches for minorities and disadvantaged people.³

The question about whether group sports are as effective has not been addressed in any great detail. While there is an argument that any activity is better than none, scientifically we really should be able to know what activity, what duration, and what intensity, work in which individuals for preventing a variety of outcomes. The paper that follows (Thornley et al.) addresses the issue of people who would like to play a group sport in an informal setting—“small-sided”—rather than run on the treadmill. It is too small a study to really generate much more than an inference that group sports can be tested and may make some difference, but in terms of leading the way to further large studies, this certainly is an important paper. However, it does point to the difficulty in recruitment and follow-up with lifestyle interventions. It also raises the overall question whether the RCT is the right format. If I have a patient who wants to undertake this sort of group exercise, will that be as effective as other forms of exercise? The inherent problem is that we do the physical activity we like, and if a trial finds that running, or ice hockey has an NNT lower than small-sided soccer, am I really going to be able to change my patient? However, knowing what activities work best may change the activities we promote at school and college. In the meanwhile I will keep running.

Martin G Dawes

MB BS, MD, FRCGP,
Professor and Head of
Department of Family
Medicine, University
of British Columbia,
Vancouver, Canada

References

1. Kannel WB, Sorlie P. Some health benefits of physical activity. The Framingham Study Arch Intern Med. 1979;139(8):857–861.
2. Haskell WL, Lee I-M, Pate RR, Powell KE, Blair SN, Franklin BA, Macera CA, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association Circulation 11. 2007;1081–1093.
3. Paulweber B, Valensi P, Lindström J, Lalic NM, Greaves CJ, McKee M, Kissimova-Skarbek K, et al. A European evidence-based guideline for the prevention of Type 2 diabetes. Horm Metab Res. 2010;42. Suppl 1,S3–36.

CORRESPONDENCE TO: Martin Dawes

Professor and Head of
Department of Family
Medicine, University
of British Columbia,
Vancouver, Canada
martin.dawes@ubc.ca

Can the prevalence of diagnosed diabetes be estimated from linked national health records?

The validity of a method applied in New Zealand

Simon Thornley MPH;¹ **Craig Wright** BSc;² **Roger Marshall** PhD;¹ **Gary Jackson** MPH;³ **Paul L Drury** MA, MB BChir;⁴ **Susan Wells** PhD;¹ **James Smith** MPH;⁵ **Wing Cheuk Chan** MPH;⁶ **Romana Pylypchuk** MPH;¹ **Rod Jackson** PhD¹

¹The University of Auckland,
Auckland, New Zealand

²Ministry of Health,
New Zealand

³Health Partners Consulting
Group, Auckland

⁴Diabetes Services, Auckland

⁵Queensland Health,
New Zealand

⁶Counties Manukau District
Health Board, New Zealand

ABSTRACT

INTRODUCTION: With projected global increases in the prevalence of Type 2 diabetes, the health sector requires timely assessments of the prevalence of this disease to monitor trends, plan services, and measure the efficacy of prevention programmes.

AIM: To assess the validity of a method to estimate the prevalence of diagnosed diabetes from linked national health records.

METHODS: We measured the agreement between a diabetes diagnosis (using combined national lists of drug dispensing, outpatient attendance, laboratory tests (HbA1c) and hospital diagnoses) and a primary care diabetes diagnosis in a (PREDICT™) cohort of 53 911 adult New Zealanders. The completeness of the diagnosis of diabetes in the cohort was estimated using capture-recapture methods.

RESULTS: The primary care cohort had a high prevalence of recorded diabetes (20.9%, 11 266/53 911), similar to our derived prevalence of 20.1%. Of the participants with a diagnosis of diabetes, 89% (10 182/11 266) had a similar derived diagnosis, indicating that only about one in 10 people with a primary care diagnosis had not been either admitted to hospital, seen at outpatient clinics, prescribed diabetes drugs or undertaken regular HbA1c tests. The capture-recapture prevalence of diagnosed diabetes in this cohort was 23.7% indicating that primary care diagnoses in the cohort were about 90% complete.

DISCUSSION: A method for estimating the prevalence of diagnosed diabetes from national health data shows high-level agreement with primary care records. Linked health data can provide an efficient method for estimating the prevalence of diagnosed diabetes in regions where such records are individually linked.

KEYWORDS: Diabetes mellitus, Type 2; epidemiology; prevalence; medical records

Introduction

The prevalence of diabetes has increased dramatically over the last half century, despite public health efforts to restrain it.^{1,2} Diabetes is an important risk factor for cardiovascular disease, and the health costs associated with treating the disease and its sequelae are considerable. Surveillance of diabetes prevalence is important to assist resource allocation decisions, assess the efficacy of nutrition regulation and health promotion pro-

grammes intended to reduce the incidence of this disorder, monitor services, and inform quality-of-care programmes for diabetes.

Regular large community surveys would be the ideal way to assess trends in diabetes prevalence, but two major problems beset this approach: non-response bias and expense. Non-response bias limits the generalisability of results and may bias estimates. Further, response rates to community surveys have been falling over the past 25 years.

For example, the 2006 New Zealand Health Survey had a non-response rate of 30%.³

An alternative to surveys is the use of health-related administrative datasets. In New Zealand the National Health Index (NHI) number is a unique identifier that is assigned to almost all New Zealand residents (98% in 2008). This allows the merging of different records to develop a picture of an individual's health and treatment received. Use of some drugs is largely limited to the treatment of single diseases; thus oral hypoglycaemic agents and insulin are almost exclusively restricted to the treatment of diabetes. From this assumption, dispensing lists may be combined with recorded hospital discharge diagnoses of diabetes to infer that an individual has diabetes.

We have been investigating the use of linked national health datasets for several years to assess diabetes prevalence and these are currently used to plan health services. The accuracy of diabetes

WHAT GAP THIS FILLS

What we already know: Extensively linked health data may indicate whether individuals in the New Zealand population have diabetes. This information may be aggregated to derive population estimates of diabetes prevalence; however, the accuracy of this method is unknown.

What this study adds: Combined diabetes drug use, laboratory test, hospital diagnosis, and outpatient clinic data show high-level agreement with an independently derived primary care diagnosis of diabetes. Such methods can yield an accurate estimate of prevalence of diagnosed diabetes in New Zealand.

risk assessed using PREDICT™, which is a web-based clinical decision support system, to generate a Framingham-based cardiovascular risk assessment and provide patient-specific management advice. PREDICT™ automatically writes the risk profile to the patient's electronic health record and also anonymously stores a copy on a secure

Surveillance of diabetes prevalence is important to assist resource allocation decisions, assess the efficacy of nutrition regulation and health promotion programmes... monitor services, and inform quality-of-care programmes for diabetes.

prevalence estimates derived from such combined datasets is uncertain. In the current study, we assessed their accuracy in a large primary care-based cohort which had its diabetes status formally documented while undergoing cardiovascular risk assessment. The level of under-count of diagnosed diabetes in the cohort was also estimated using capture-recapture methods.

Methods

Study population

We used diabetes diagnosis status in a cohort of 53 911 primary care patients who had completed a formal cardiovascular risk assessment as the comparator for assessing the validity of our derived diabetes prevalence estimate. The cohort had been

server identified only by an encrypted NHI code. We used this latter database for our analyses.

The PREDICT™ cohort has been described elsewhere.⁴ For these analyses, we used a subset of patients who had been risk assessed between 1 January 2007 and 15 December 2008 as part of routine primary care practice. This population consisted of 53 911 patients, mainly from the Auckland and Northland regions of New Zealand, who had attended primary care practices that use PREDICT™. They were expected to have a higher prevalence of diabetes than the general population because, at the time of these analyses, fewer than 20% of the eligible population had been assessed, and initial screening targeted higher-risk patients. Cohort participants who died during this period were excluded from

the dataset. Therefore, all study participants were alive throughout the study period and had the same 'health exposure time' so that they could have been recorded in national datasets.

Documented primary care diagnosis of diabetes

As part of the risk assessment, general practitioners or practice nurses must assign a diabetes status to all patients on a template to either 'no-diabetes', 'type-1', 'type-2' or 'type-unknown'. A label of diabetes in the PREDICT™ cohort was assumed to be an accurate 'documented primary care diabetes diagnosis' because, when a patient was assigned a diagnosis of diabetes, a series of additional questions specifically relevant to this diagnosis automatically appeared on the template and had to be answered before the risk assessment could be completed and the data stored. This will be referred to as the 'Predict diabetes diagnosis' from here on.

Derived diagnosis of diabetes from national health data

A range of recorded health care activities from national, routinely collected health data was gathered on this Predict cohort, and combined to derive a diagnosis of diabetes to compare with the Predict diabetes diagnosis. Any appearance in one of the following four national lists was used as evidence of diabetes:

1. A hospital discharge diagnosis of diabetes anywhere among the coding (ICD 10: E10-E14, O24.0 to O24.3, ICD 9:250 all excluding ICD 10:O24.4 (diabetes arising in pregnancy)), taken from 1998 to 2008
2. Outpatient visits to specialist diabetes clinics (2004 to 2007)
3. Dispensing lists from community pharmacies for oral hypoglycaemic agents or insulin (2001 to 2008)
4. Five or more plasma HbA1c tests between 1 July 2006 and 30 June 2008 in lists of laboratory test claims (these indicate occurrence of the test only, not the results).

In contrast to the Predict diabetes diagnosis, we refer to this indicator of diabetes as the 'derived diabetes diagnosis'. Five or more HbA1c test

claims on the laboratory list in two years were used as the final criterion because preliminary investigation showed this cut-off resulted in the best agreement with the other three lists for patients diagnosed with diabetes.

Capture-recapture and statistical methods

To test whether the prevalence of diabetes diagnoses (from either method—Predict or derived) was complete, we estimated the overall prevalence of diagnosed diabetes in this cohort by using a statistical technique known as capture-recapture. Such a method links the three national lists most likely to accurately represent diabetes diagnoses (hospital discharge codes, hospital diabetes outpatient clinic visits, dispensing of diabetes drugs, and diabetes from Predict) to the counts found in intersecting combinations of these lists.

Each of these lists was considered a proxy for diagnosed diabetes, but none were expected to be complete; in contrast, capture-recapture methods estimate a 'virtual' complete total. Capture-recapture estimates of diabetes prevalence have been calculated in Italy⁵ and the UK⁶ using similar datasets to those available in New Zealand.

We used log-linear models to adjust for between-list dependence, using the Rcapture utility⁷ of the R-project.⁸ Numbers of people with diagnosed diabetes, in varying combinations of lists, were modelled as dependent variables; with independent variables comprising dummy indicators of the included lists. Interaction terms, which accounted for between-list dependence, were included in the models. The model with the least number of interaction terms that also demonstrated evidence of good model fit, was selected to estimate prevalence. Model fit was estimated by comparing Akaike's Information Criterion (AIC), chi-square statistics, and plots of Pearson residuals with predicted values, for competing models. All other calculations were carried out using the R-project (EpiCalc⁹ utility) or Microsoft Excel™. Scaled rectangle diagrams (similar to Venn diagrams) to display overlap in the datasets used for the combined list and capture-recapture methods were drawn using SPAN software.¹⁰

Table 1. Cohort characteristics, by Predict diabetes diagnosis (compared to 2006 Census, aged ≥ 15 years)

	Primary care diabetes diagnosis?		Predict cohort total	Census*
	Yes n (row %)	No n (row %)	n (col. %)	(col. %)
TOTALS	11 266	42 645	53 911	
Gender				
Male	5966 (20.2)	23 617 (79.8)	29 583 (54.9)	(48.8)
Female	5300 (21.8)	19 028 (78.2)	24 328 (45.1)	(51.2)
Age category				
15–24	35 (29.7)	83 (70.3)	118 (0.2)	(21.8)
25–34	186 (18.3)	830 (81.7)	1016 (1.9)	(19.9)
35–44	1096 (15.6)	5943 (84.4)	7039 (13.1)	(23.5)
45–54	2661 (17.4)	12 614 (82.6)	15 275 (28.3)	(15.8)
55–64	3487 (21.5)	12 713 (78.5)	16 200 (30.0)	(10.2)
65–74	2548 (25.9)	7303 (74.1)	9851 (18.3)	(8.8)
Over 75	1253 (28.4)	3159 (71.6)	4412 (8.2)	(21.8)
Ethnic group				
Other†	4946 (14.9)	28 144 (85.1)	33 090 (61.4)	(73.7)
Pacific	3459 (34.9)	6451 (65.1)	9910 (18.4)	(5.3)
Maori	1988 (23.1)	6627 (76.9)	8615 (16)	(12.4)
South Asian	873 (38.0)	1423 (62.0)	2296 (4.3)	(8.6)*
Deprivation index				
1 and 2 (least deprived)	954 (14.2)	5783 (85.8)	6737 (12.5)	(18.6)
3 and 4	1378 (16.7)	6874 (83.3)	8252 (15.3)	(18.7)
5 and 6	1921 (18.4)	8510 (81.6)	10 431 (19.4)	(20.5)
7 and 8	2775 (21.9)	9893 (78.1)	12 668 (23.6)	(21.9)
9 and 10 (most deprived)	4217 (26.9)	11 474 (73.1)	15 691 (29.2)	(20.3)

* Census estimate includes all Asian (that is Chinese, South Asian and South East Asian).

† Includes New Zealand European, New Zealand's largest ethnic group.

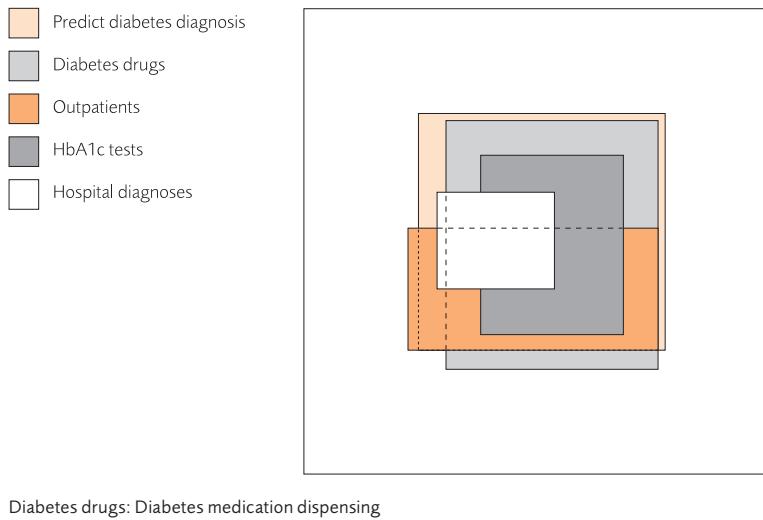
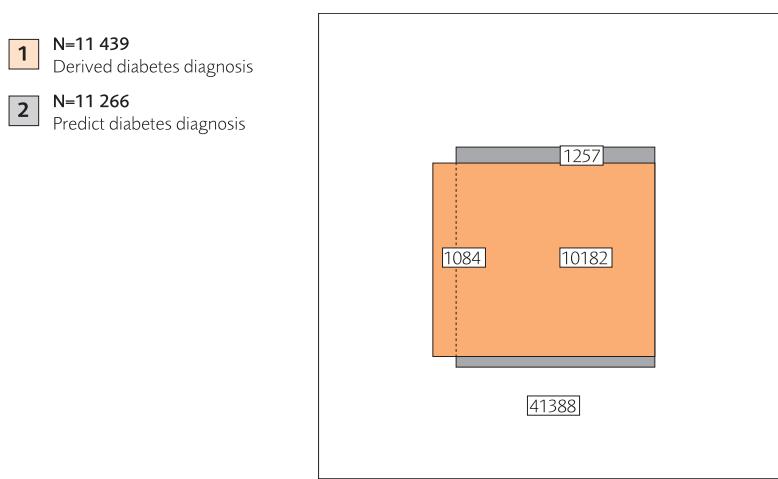
The Predict cohort study was approved by the national Multi-Region Ethics Committee in 2007 (MEC/07/19/EXP).

Results

The overall prevalence of a documented diagnosis of diabetes in the Predict cohort was 20.9% (11 266/53 911) (Table 1). The Predict cohort also had higher proportions of males, Pacific and Maori ethnic groups and people of low socioeconomic status compared with proportions derived from census estimates (the final column in the Table 1). The highest prevalence of a

documented diagnosis of diabetes was amongst South Asian people (38%; 873/2296), followed by Pacific peoples (35%; 3459/9910) and Maori (23%; 1988/8615). The remainder, who were mainly European, had a diagnosed diabetes prevalence of 15% (4946/33 090). People with diabetes were slightly older and a higher proportion were in low socioeconomic groups compared to those without such a diabetes diagnosis.

The agreement between groups with diabetes-related activity identified from the four national datasets and those with a Predict diabetes diagnosis in the cohort was high, shown by the

Figure 1. Scaled rectangle diagram of overlap between elements of the 'algorithm'*Figure 2. Scaled rectangle diagram of agreement between combined list algorithm-based (CLE) label of diabetes and the primary care (PREDICT™) diagnosis of diabetes*

scaled rectangle diagram (Figure 1). The outer rectangle represents the entire Predict cohort of 53 911 participants; the inner rectangles are the five overlapping groups with records of diabetes-related activity in national datasets (elements of the derived diabetes diagnosis) or a Predict diabetes diagnosis. The rectangles are scaled according to size of the groups and the degree

of overlap. The diagram shows that nearly all of the patients with diabetes-related activities from the national outpatient ($n=6009$), inpatient ($n=2176$) and laboratory datasets ($n=5069$) are captured by the Predict diabetes diagnosis ($n=11 266$). While most people on the national drug dispensing list ($n=10 157$) also possess a Predict diabetes diagnosis, a substantial minority (9% [903/10 157]) did not have a Predict diagnosis of diabetes. Conversely, about one in 10 people (1084/11 266) who had a Predict diabetes diagnosis did not have a corresponding derived diagnosis.

The overlap between the derived and Predict diagnoses is illustrated in Figure 2. The derived diagnosis identified 89% (10 182/11 439) of people who had a Predict diabetes diagnosis, and 97% (41 388/42 472) of people who did not have a Predict diabetes diagnosis had the equivalent derived diagnosis. Of people identified with a derived diabetes diagnosis, 90% (10 182/11 266) had a corresponding Predict diagnosis, while among those without a derived diagnosis, 97% (41 388/42 472) had the same status in diabetes diagnosis in Predict. A non-conditional measure of agreement (Cohen's kappa coefficient) was 0.87, indicative of a high level of concordance between the two indicators.

The four lists (Predict diabetes diagnosis, hospital diabetes diagnosis, diabetes drug dispensing and outpatient diabetes clinic attendance) considered to be most specific for diabetes were combined to estimate the 'total' or 'virtual' prevalence of diagnosed diabetes in the cohort using capture-recapture methods. Plots of Pearson residuals indicated acceptable model fit for the chosen log-linear model, which also minimised Akaike's Information Criterion. The final number of people with a 'total' diagnosis of diabetes in this cohort was estimated at 23.7% (12 778/53 911; 95% CI 22.5%–25.9%), which is slightly larger than that estimated by combining the Predict and derived diagnoses (23.2%; 12 523/53 911). The derived estimate of people with diabetes was about 90% of this estimated capture-recapture total (11 439/12 778), similar to the Predict diabetes diagnosis estimate, which was 90% of the 'virtual' estimate (11 266/12 778).

Discussion

Our study showed high levels of agreement between a derived diabetes diagnosis, based on combining lists of national, routinely collected health data, and a diagnosis from a primary care database, in people undergoing CVD risk assessment. This suggests that the combined list method may be a useful surrogate for diagnosed diabetes to monitor trends in diabetes prevalence. Secondly, we showed that an electronic clinical decision support system used in routine primary care practice captures up to 90% of all diabetes diagnoses among patients to which it is applied.

The main strength of this study is that we had access to a large primary care cohort in which a documented diagnosis of diabetes is likely to be accurate. Further, the capture-recapture analyses indicated that use of the Predict system results in over 90% of all people with diabetes in the cohort being labelled appropriately.

Conversely, a limitation of the study was the nature of the sampling which led to entry into the Predict cohort. The Predict population had a higher proportion of people with diabetes (21%) compared to the general population, estimated at 4.3% (based on self-report from the last national health survey³). This is likely to be due to many of the cohort participants being enrolled by their primary health care providers for a formal cardiovascular risk assessment, if they were believed to be at increased risk of developing CVD, by virtue of advanced age, or risk factors for the disease, or a combination of both.

The capture-recapture estimates of ‘total’ prevalence need to be interpreted with caution as they are limited by the assumptions that underlie their use. We used four lists, thought to be relatively specific for a diagnosis of diabetes; however, false positives may be present (e.g. metformin is sometimes used to treat polycystic ovarian syndrome) and may inflate prevalence estimates. Also, the number in intersecting lists is assumed to have a Poisson distribution (so that appearance on individual lists is independent of other subjects). Clustering of individuals on list counts by characteristics such as health service use, ethnic group, deprivation and age are likely to occur, and

so the precision of the estimates may be over-inflated. Another weakness is that patients who are treated with diet or lifestyle measures alone who have not been admitted or been to a diabetes clinic, would not be captured unless they had five or more HbA1c tests within two years—more than recommended by national guidelines.¹¹

The use of routinely collected national data has limitations. Because the datasets are not collected primarily for research purposes, significant heterogeneity in record collection in different administrative regions may occur. The completeness of linkage of health data by national health identifier has improved markedly over the last three to four years in New Zealand, but wider variability in the linkage of older health records used may affect the accuracy of the derived diagnosis method. These data quality issues should, however, improve further with time.

Internationally, authors have reported the use of derived diabetes prevalence from health records and capture-recapture estimates of diabetes prevalence, although not in the same study. The combined list estimate method has been used previously in Denmark¹² to describe time trends in diabetes prevalence between 1995 and 2006. The researchers used a similar technique to ours; however, five or more blood glucose measurements in a year, rather than aggregate numbers of HbA1c, was used as laboratory evidence of diabetes. A comparable study from Ontario used a rule that included a diagnosis in hospital discharge or outpatient records in the last two years as evidence that an individual has diabetes.¹ The sensitivity of the diabetes diagnosis associated with our derived diagnosis (89%) is similar to those quoted in Danish (85%)¹² and Canadian (86%) studies.¹³ In contrast, a British study showed that the sensitivity of multiple record linkage, similar to the sources used in our study, was 91%, and more sensitive than general practice records.¹⁴

Local attempts to define the prevalence of diabetes have included combining primary health care registers using diagnosis codes, diabetes medications, laboratory tests and screening programme registers. This method has shown high levels of concordance between the lists, similar to our results; however, the method is limited by

organisational and geographic boundaries.¹⁵ Our derived indicator of diabetes allows national prevalence of diabetes to be calculated.

Capture-recapture study examples include the Casale Monferrato study that monitored the prevalence of diabetes in this area of northwest Italy between 1988 and 2000.⁵ Data from diabetes clinics, hospital discharge records, prescribing and sales of reagents and strips were combined to calculate population estimates. Comparing individual to capture-recapture methods, they found a diagnosis rate of about 80%, which is slightly lower than our estimate. In the United Kingdom similar capture-recapture studies of diabetes have been reported.^{6,16}

We have previously carried out a more limited validation study of our derived diabetes prevalence method using a hospital-based diabetes register from a disease management programme as a gold standard.¹⁷ We were aware that the register only included about half of the people with a diagnosis of diabetes in the population served by this hospital. Therefore, this earlier study was only able to assess the 'sensitivity' of the derived diagnosis. With these caveats, the proportion with a derived diagnosis, among those on the diabetes register (96%) from the earlier study, was higher than in the present analysis.

Conclusion

A derived indicator of diabetes diagnoses, based on linking routine national data, shows substantial agreement with a documented primary care diagnosis of diabetes. Routinely collected health data can provide a rapid and efficient way of monitoring the prevalence of diagnosed diabetes, and its change over time, with reasonable accuracy.

ACKNOWLEDGEMENTS

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COMPETING INTERESTS

None declared.

References

- Lipscombe LL, Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995–2005: a population-based study. [See comment]. Lancet. 2007 Mar 3;369(9563):750–6.
- Ministry of Health. Diabetes surveillance: population-based estimates and projections for New Zealand, 2001–2011: Public Health Intelligence Occasional Bulletin No. 46. Wellington: Ministry of Health, 2007.
- Ministry of Health. A Portrait of Health: Key Results of the 2006/07 New Zealand Health Survey. Wellington: Ministry of Health, 2008.
- Wells L. Getting evidence to and from general practice consultations for cardiovascular risk management using computerised decision support. Auckland: University of Auckland; 2009.
- Bruno G, Merletti F, Bargero G, et al. Changes over time in the prevalence and quality of care of Type 2 diabetes in Italy: the Casale Monferrato surveys, 1988 and 2000. Nutr Metab Cardiovasc Dis. 2008 Jan;18(1):39–45.
- Gill GV, Ismail AA, Beeching NJ. The use of capture-recapture techniques in determining the prevalence of Type 2 diabetes. QJM. 2001 Jul;94(7):341–6.
- Baillargeon S, Rivest L-P. Rcapture: loglinear models for capture-recapture in R. Journal of Statistical Software. 2007;19(5):1–31.
- R Development Core Team. R: a language and environment for statistical computing. Vienna: R Foundation for Statistical Computing; 2007.
- Chongsuvivatwong V. Analysis of epidemiological data using R and Epicalc. Prince of Songkla University; 2008.
- Marshall RJ. Scaled rectangle diagrams can be used to visualize clinical and epidemiological data. J Clin Epidemiol. 2005 Oct;58(10):974–81.
- New Zealand Guidelines Group. Management of Type 2 diabetes. Wellington: New Zealand Guidelines Group; 2003.
- Carstensen B, Kristensen JK, Ottosen P, Borch-Johnsen K, Steering Group of the National Diabetes R. The Danish National Diabetes Register: trends in incidence, prevalence and mortality. Diabetologia. 2008 Dec;51(12):2187–96.
- Hux JE, Ivis F, Flintoft V, Bica A. Diabetes in Ontario: determination of prevalence and incidence using a validated administrative data algorithm. Diabetes Care. 2002 March 1, 2002;25(3):512–6.
- Morris AD, Boyle DIR, MacAlpine R, et al. The diabetes audit and research in Tayside Scotland (darts) study: electronic record linkage to create a diabetes register. BMJ. 1997 August 30, 1997;315(7107):524–8.
- Joshy G. Linking existing databases to monitor and improve diabetes care. Hamilton: University of Auckland; 2010.
- Ismail AA, Beeching NJ, Gill GV, Bellis MA. How many data sources are needed to determine diabetes prevalence by capture-recapture? Int J Epidemiol. 2000 Jun;29(3):536–41.
- Thornley S, Marshall R, Jackson G, et al. Estimating diabetes prevalence in South Auckland: how accurate is a method that combines lists of linked health datasets? N Z Med J. 2010;123(1327):76–86.

Randomised controlled trial of informal team sports for cardiorespiratory fitness and health benefit in Pacific adults

Mark G Biddle BHMS(Hons);¹ **Grace Vincent** BSc(Hons);¹ **Alana McCambridge** BSc(Hons);¹ **Gabrielle Britton** PGDip;¹ **Ofa Dewes** MBA;² **C Raina Elley** MBChB, PhD;² **Simon A Moyes** MSc;² **Johann Edge** PhD¹

ABSTRACT

INTRODUCTION: Rates of obesity, Type 2 diabetes and cardiovascular disease are high among Pacific people in New Zealand. Physical activity is recommended in the prevention and management of these conditions. Community-based, 'small-sided game' group activities may be an effective and culturally appropriate way to promote physical activity within Pacific communities.

AIM: To assess the effectiveness of small-sided games-based exercise on fitness and health parameters among Pacific adults over four weeks.

METHODS: Twenty untrained (13 female) Pacific adults were randomised to intervention or control. Intervention participants were offered 45 minutes of small-sided games three times per week for four weeks. Control participants were offered one-month gym membership after the trial. Primary outcomes included cardiorespiratory fitness (VO_2peak) and leg strength (maximal concentric force of quadriceps at 60°/second) measured at baseline and four weeks. Secondary outcomes included glycaemia, lipid profile, blood pressure (BP), and inflammatory markers. Multivariable regression models were used to assess differences between groups, adjusting for baseline values, age and gender.

RESULTS: At baseline, mean age was 34.8 years (SD 12.6), BMI 36.3 (6.7), systolic BP 127.7 mmHg (12.1), HbA1c 6.1% (1.9), VO_2peak 2.5 L/min (0.6) and leg strength 170.0 N.m (57.4). Sixteen participants completed the trial. Change in outcomes were greater in intervention than control participants in absolute VO_2peak (0.9 L/min ($p=0.003$)), leg strength (17.8 N.m ($p=0.04$)) and HDL (0.12 mmol/L ($p=0.02$)). There were no other significant differences.

DISCUSSION: Small-sided games appear to be a promising means for improving the health and cardiorespiratory fitness and reducing the risk of diabetes and cardiovascular disease in Pacific adults.

KEYWORDS: Exercise; diabetes mellitus, Type 2; Pacific Islands; randomized controlled trial; health promotion

¹Department of Sport and Exercise Science, The University of Auckland, Auckland, New Zealand

²School of Population Health, The University of Auckland

Introduction

Rates of obesity among Pacific people in New Zealand are increasing, with recent estimates indicating that 64% of Pacific adults are classified as obese compared with approximately 23% of European and other groups.¹ Moreover, Pacific children are 5.3 times more likely to develop obesity than children from other ethnic groups.² The prevalence of diabetes is also much higher

among Pacific people than most other ethnic groups in New Zealand, and has been estimated from a recent study to be 19.5% for Pacific adults compared with 3.9% for Europeans and 12.0% for Maori.³ Impaired Glucose Tolerance (IGT), a precursor condition to diabetes, is present in 7.9% of Pacific people compared with 7.3% of Maori and 6.7% Europeans.⁴ These statistics illustrate that diabetes and IGT inflict considerable morbidity on the New Zealand population, particularly

CORRESPONDENCE TO:

C Raina Elley
Department of General Practice and Primary Health Care, School of Population Health, The University of Auckland, PB 92019, Auckland, New Zealand
c.elley@auckland.ac.nz

within Pacific communities. Since diabetes and IGT are also underlying risk factors for the development of cardiovascular disease (CVD),^{5,6} effective and engaging interventions are needed to address the escalating and widespread problem of diabetes within this population.

There is increasing evidence to suggest that lifestyle interventions are more effective in reducing the incidence of diabetes compared with drug treatment.⁷⁻⁹ Individuals who engage in regular exercise demonstrate a lower incidence of diabetes, improved metabolic control and a reduced prospective risk for the development of diabetes.^{10,11} Although the mechanisms behind this phenomenon are only partially understood,¹² there is evidence that resistance training enhances insulin sensitivity¹³⁻¹⁵ and the control of glucose is also improved through the increased capillary-to-muscle ratio that is the result of

Pacific people report lower amounts of leisure activity than other New Zealanders.²⁵ Furthermore, Pacific people tend to be community-based and also tend to perform informal exercise in groups.²⁵ Exercise interventions for diabetes, and recommendations by governing bodies such as the American College of Sports Medicine, prescribe individualised exercise, such as jogging, cycling or gym-based training. In the current study, we propose that game-based activity such as touch rugby and social football may be more culturally appropriate for group-based populations, while also providing important health benefits. No study has explored whether game-based group exercise can result in health benefits within New Zealand's Pacific community. However, recent research supports the use of this type of exercise in improving health and fitness. Improvements in VO_{2max} , peak sprinting speed, muscle enzyme activity and cardiac adaptations including an

Individuals who engage in regular exercise demonstrate a lower incidence of diabetes, improved metabolic control and a reduced prospective risk for the development of diabetes.

aerobic training.¹⁶ Therefore, glucose metabolism and metabolic control via exercise is a critical area for investigation in the high-risk pre-diabetic and diabetic population. These findings support the contention that exercise training either alone or in conjunction with diet or medication should be a fundamental component in the prevention and treatment of Type 2 diabetes.¹⁷

An additional benefit of exercise, particularly cardiorespiratory exercise, is that it decreases the likelihood of conditions such as cardiovascular disease (CVD) or high blood pressure,^{18,19} which are two of the leading causes of mortality and morbidity among sedentary, overweight populations.²⁰⁻²² By training the aerobic system, heart rate and vascular stiffness are reduced.²³ For overweight and obese individuals, aerobic activity will reduce the chances of CVD and can also lead to increased self-confidence and an improved quality of life.²⁴

increase in left ventricular wall thickness, were found in studies of small-sided football games among 38 middle-aged adults over 12 weeks²⁶ and among 21 sedentary women over 16 weeks.²⁷

Therefore, the purpose of this preliminary trial was to determine whether game-based activities involving small teams ('small-sided games') in a social environment could produce improvements in cardiorespiratory fitness, strength and cardiovascular risk factors in Pacific adults, with a view to conducting a larger investigation of the impact of this intervention on Type 2 diabetes.

Methods

This parallel, randomised controlled trial assessed whether a small-sided games exercise intervention compared with control could improve cardiorespiratory fitness, strength and diabetic and cardiovascular risk profiles over four weeks

amongst Pacific adults in the Auckland Tamaki community.

Study population

Pacific adults from 16 to 65 years of age who were currently engaged in less than three planned exercise sessions per week and with no previous cardiovascular disease or contraindication to exercise, as assessed by the Physical Activity Readiness Questionnaire (PAR-Q),²⁸ were eligible to participate in the study. Consultation was undertaken with leaders of Pacific churches to determine the most appropriate approach to invite potential participants from the church community. Participants were recruited through local church leaders, notices in a local general practice and a local secondary school, and by word of mouth within the Tamaki community in East Auckland. Written informed consent was obtained from all participants. The trial was approved by The University of Auckland Human Participants Ethics Committee (ref. 2009/536). The trial was registered with the Australia New Zealand Clinical Trials Register (ACTRN 12610000003077).

Outcome measures

Outcome measures were assessed at baseline after informed consent and before randomisation, and again at four-week follow-up. Primary outcomes included cardiorespiratory fitness (VO_{2peak}) and leg strength (maximal concentric force of quadriceps at 60°/second). Secondary outcomes included fasting glucose and glycated haemoglobin (HbA1c), lipid profile, blood pressure and C-reactive protein (CRP).

Cardiorespiratory fitness was assessed using a ramp VO_{2peak} test on a cycle ergometer (Velotron CS 1.5).²⁹ The protocol followed a formula created by Hansen et al. to set appropriate clinical VO_{2peak} protocols for obese populations.³⁰ The sex, age and weight of the participant determined the initial load and incremental increase in load throughout the test. Gas analysis was performed to determine gas volume and composition (Metamax 3B).³¹ Heart rate (Polar) and rate of perceived exertion (Borg Scale) was measured every minute and two minutes, respectively.³² The cessation of the test was determined by volitional fatigue of

WHAT GAP THIS FILLS

What we already know: The prevalence of obesity and Type 2 diabetes is high in the New Zealand Pacific community. Increasing physical fitness helps prevent and reduce obesity and Type 2 diabetes.

What this study adds: Community-based group activities may be an appropriate way to promote regular physical activity in Pacific communities in New Zealand. Community-based, small-sided games activities offered three times per week improved cardiorespiratory fitness and strength compared with control (no organised activities) among less active adults in a local Pacific community over a four-week period.

the participant or inability to maintain cadence above 60 revolutions per minute.

Quadriceps strength was assessed using a Biodex machine (Biodex System 2). Isokinetic strength was measured at eight different speeds (30, 60, 90, 120, 150, 210, 270, 330°/sec). Participants performed two repetitions of maximal extension at each speed with their right leg. Peak torque of the quadriceps muscles was subsequently recorded at each speed.

Assessments were undertaken at the Unisports exercise laboratory at The University of Auckland. Early morning fasting venous blood was also taken at the Unisports laboratory and delivered to an accredited laboratory in Auckland (Diagnostic Medlab) for analysis. Blood pressure was assessed using the mean of the second and third measurement from three consecutive recordings. Other variables measured include weight, height and waist circumference. Weight was measured using the laboratory scales (Seca) while height and waist circumference were determined using a tape measure. Waist circumference was measured midway between the last rib and iliac crest.

Participants were also given the opportunity to provide written feedback about the intervention at the end of the trial.

Randomisation and blinding

Computer-generated 1:1 randomisation was carried out using STATA 9.1, and preparation of numbered, opaque, sealed envelopes was undertaken by a researcher (CRE) who was not

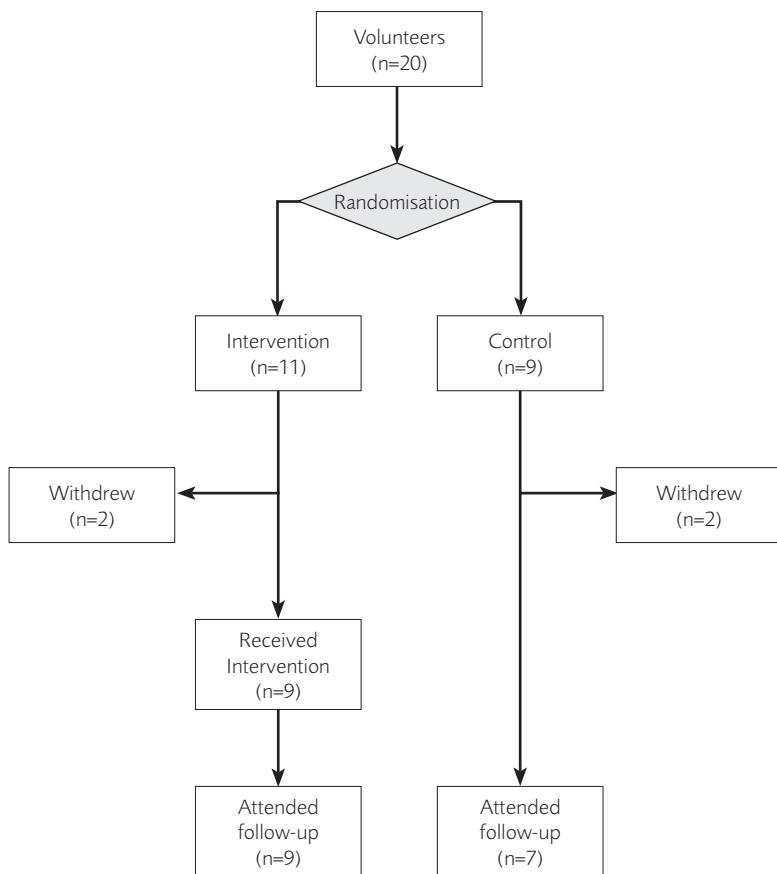
Table 1. Baseline characteristics of study participants

Characteristic*	Control n=9 n (%)	Intervention n=11 n (%)	Total n=20 n (%)
Age, years	34 (17.4)	35.1 (7.8)	34.8 (12.6)
Female n (%)	6 (66.7)	7 (63.6)	13 (65)
BMI, kg/m²	33.1 (6.4)	38.9 (5.9)	36.3 (6.7)
Waist (cm)	98.7 (10.0)	114.7 (15.5)	107.5 (15.3)
HbA1c, mmol/mol	43.3 (25.2)	43.9 (16.9)	43.6 (20.3)
HbA1c, %	6.1 (2.3)	6.2 (1.5)	6.1 (1.9)
Systolic BP, mmHg	124.8 (11.2)	130.0 (12.9)	127.7 (12.1)
Diastolic BP, mmHg	80.8 (10.2)	84.0 (9.7)	82.6 (9.8)
VO₂peak (absolute), L/min	2.5 (0.7)	2.4 (0.6)	2.5 (0.6)
Strength ext quad 60° Nm[†]	154.7 (57.2)	182.6 (57.2)	170.0 (57.4)

* Mean (standard deviation) unless otherwise indicated

[†] Strength of quadriceps extension at 60° in Newton metres

Figure 1. Consort diagram of the randomised controlled trial of small-sided games versus control



involved in enrolment or assessment. Participant enrolment and baseline assessment were undertaken by postgraduate exercise science students (GV, AM and GB) and the principal investigator (HE). Assessors remained blind to allocation of intervention until after baseline assessment when numbered envelopes were opened consecutively to determine group allocation. Blinding of assessors was not possible at follow-up assessment. Objective measures were used where possible (e.g. blood results) and fitness measures were carried out using a standard protocol and consistent feedback. Blinding of participants was not possible.

Intervention

The participants in the intervention group were encouraged to attend three training sessions per week over four weeks. The sessions comprised various small-sided games including soccer, basketball, volleyball, touch rugby, cricket and other non-conventional games such as 'chain tag', 'rob the nest' and 'bullrush'. All sessions were carried out at The University of Auckland Tamaki campus grounds (outside) or in the university gym for volleyball when the weather was wet. Each session lasted 45 minutes and included a 10-minute warm-up period and regular rest periods. The sessions were supervised and conducted by the three sports and exercise postgraduate students. Basic technical advice was given to the participants for safety reasons.

Control

Control participants were instructed to maintain their normal lifestyle and were offered four weeks' gym membership once they had completed their follow-up assessment.

Sample size calculations

Means and standard deviations from previous research undertaken by JE (principal investigator) were used in sample size estimate calculations.^{33,34}

VO₂peak (mL/kg/min)

Fifteen participants per group would be required, using mean difference in change of 7.2 (SD 6.9).³³

Table 2. Changes in outcomes of intervention compared with control participants over four weeks

		Control [n=9]			Intervention [n=11]			Difference in change*	p-value
		Baseline	Follow-up Means (SD)	Change	Baseline	Follow-up Means (SD)	Change		
Primary outcomes	VO ₂ peak absolute (L/min)	2.5 (0.7)	2.4 (0.8)	-0.1 (0.6)	2.4 (0.6)	3.3 (1)	0.9 (0.7)	0.9 (0.3)	0.003
	VO ₂ peak relative [†] (mL/Kg/min)	26.4 (7.1)	27 (6.8)	0.6 (4.5)	21.9 (4.4)	29.3 (6.1)	7.4 (4.7)	4.1 (2.2)	0.09
	Strength ext quad 60° (Nm) [‡]	154.7 (57.2)	152.7 (45.7)	-2 (20.6)	182.6 (57.2)	188.7 (63.8)	6.2 (23.7)	17.8 (7.8)	0.04
Secondary outcomes	Fasting glucose (mmol/L)	6.5 (3.8)	6.3 (3.6)	0.0 (0.2)	6.0 (2.6)	5.2 (1)	-0.8 (2.5)	-0.99 (0.81)	0.2
	HbA1c (%)	6.1 (2.3)	6.0 (2.2)	0.0 (0.1)	6.2 (1.5)	5.5 (0.5)	-0.7 (1.4)	-0.7 (0.5)	0.1
	Total cholesterol (mmol/L)	5.4 (1.4)	4.9 (1.5)	-0.3 (0.5)	5.6 (1.4)	4.9 (1.1)	-0.6 (0.6)	-0.2 (0.2)	0.2
	HDL (mmol/L)	1.3 (0.3)	1.1 (0.3)	-0.1 (0.1)	1.2 (0.3)	1.2 (0.2)	0.0 (0.1)	0.12 (0.04)	0.02
	LDL (mmol/L)	3.0 (0.9)	2.7 (0.7)	-0.2 (0.5)	3.1 (0.9)	2.9 (0.8)	-0.1 (0.4)	0.09 (0.23)	0.7
	Triglycerides (mmol/L)	1.9 (1.6)	2 (1.5)	0 (0.5)	3.9 (4.2)	2.1 (1.5)	-1.7 (3.6)	-0.3 (0.6)	0.6
	Systolic BP (mmHg)	124.8 (11.2)	116.9 (12.1)	-7.9 (9.8)	130.0 (12.9)	124.8 (9.4)	-5.2 (11)	5.2 (4.3)	0.2
	Diastolic BP (mmHg)	80.8 (10.2)	80.1 (10.2)	-0.7 (7.2)	84.0 (9.7)	84.2 (8.8)	0.1 (11.7)	2.2 (3.9)	0.6
	C-reactive protein (mmol/L)	2.3 (1.1)	2.7 (1.2)	0.5 (0.9)	2.7 (2.5)	4.1 (5)	1.6 (3.4)	0.8 (1.2)	0.5

* Mean (standard deviation) difference in change and adjusted for gender, age and baseline value.

[†] Adjusted for weight.

[‡] Strength of quadriceps extension at 60° in Newton metres

Leg press strength (kg)

Eight participants per group would be required, using mean difference in change of 45 (SD 31)³⁴ ($\alpha=0.05$, $p=0.8$).

Analyses

Means and standard deviations of participant characteristics were calculated by group allocation. To evaluate the effect of the intervention, differences between the control and intervention groups were examined using multiple regression analyses adjusting for baseline values, age and

gender. Intention to treat analysis was undertaken. Data missing at follow-up were imputed using the last value carried forward. Per-protocol analyses were also carried out as a sensitivity analysis including only those who completed the trial to assess whether this changed results.

Results

Advertising and recruitment to the study were undertaken from mid-November 2009 to mid-January 2010. Twenty untrained (13 female and 7 male) Pacific adults volunteered to participate in the study during the recruitment phase. All

were assessed as eligible and enrolled in the study. Baseline assessments and randomisation into intervention or control groups were carried out during one week mid-January 2010 (Figure 1). At baseline, mean age was 34.8 years (SD 12.6), with participants ranging from 16 years to 64 years (Table 1). Mean weight was 103.7kg (SD 20.4) (ranging from 73 to 136 kg) and mean body mass index (BMI) was 36.3 (SD 6.7). While some characteristics were balanced at baseline, the control group had lower mean BMI, waist circumference, blood pressure and strength than the intervention group, despite random allocation. In total, 16 participants completed the trial (nine intervention and seven control). The nine intervention participants completed between 10 and 12 training sessions over the four-week period. Follow-up assessments were undertaken during one week mid-February 2010.

Table 2 displays the results of the primary and secondary outcome measures. There were significant improvements in both primary outcomes of cardiorespiratory fitness (VO_{2peak} absolute ($p=0.003$) but not relative ($p=0.09$)) and quadriceps strength ($p=0.04$) in the intervention group compared with the control. The only significant

difference found between the groups in secondary outcomes was in HDL, which reduced slightly in the control and was maintained in the intervention group ($p=0.02$). Results did not change significantly when analyses were undertaken on data from those who completed the trial only ($n=16$).

Significant increases in quadriceps strength were seen at almost all angles in the intervention group, but less so in the control group, as demonstrated in strength power curves for leg extension (Figures 2 and 3).

Written responses from the intervention participants to the question, "Do you think the small-sided games were beneficial in improving your health and wellbeing?" were generally positive:

"Definitely, awesome, really enjoyed all of the games"

"Yes it really benefited me and improved my health and wellbeing"

Examples of other comments included:

"I really enjoyed every game that the instructors had for us. It was great fun and at the same time getting fit"

"The fun games took the torture out of our fitness"

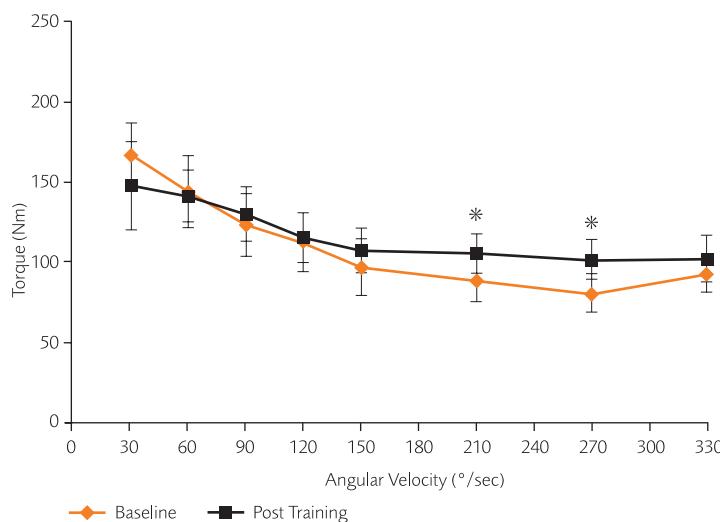
"I have signed up to do some cardio-boxing and zumba"

Discussion

Summary of findings

This four-week randomised controlled trial of a small-sided games exercise intervention found improved cardiorespiratory fitness (absolute VO_{2peak}), quadriceps strength and serum HDL compared with the control group. The informal group-based approach to the exercise intervention was well received by participants. This is the first time that physiological improvements as a result of a small-sided games-based intervention have been observed in such a short training period, and within a group of Pacific adults who represent an ethnic group at high risk of obesity, cardiovascular disease and

Figure 2. Peak torque (Nm[†]) during right knee extension at baseline and follow-up of participants in the control group who completed the study.



(Values are means \pm SE; Control group $n=7$)

* denotes significant change $p=<0.05$

[†]Nm denotes Newton metres

glucose intolerance. These results have valuable implications, as increasing cardiorespiratory fitness is associated with reduced risk of diabetes and cardiovascular events, as well as reduced all-cause mortality.^{10,20,21}

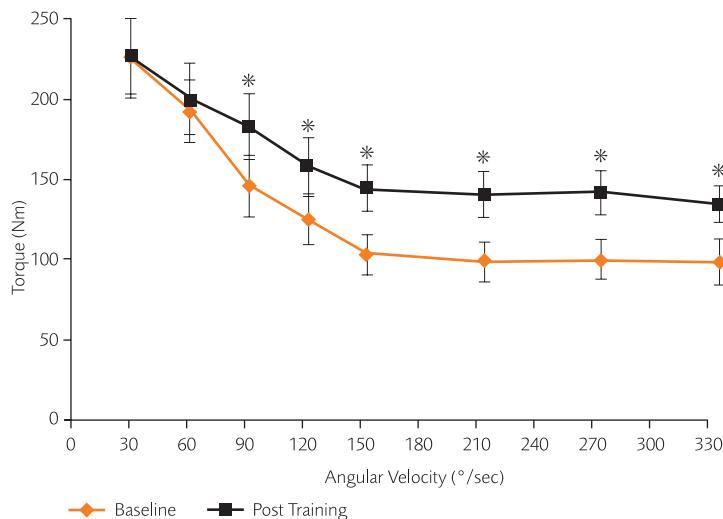
Compared with the literature

A previous trial of small-sided soccer games involving middle-aged untrained males and sedentary women over a 16-week period, found improved VO_{max} , peak sprinting speed, elevated muscle enzyme activity and significant cardiac adaptations, such as an increase in left ventricular wall thickness, end diastolic volume and systolic and diastolic performance, compared with control.^{26,27}

Despite improvements in cardiorespiratory fitness, quadriceps strength and HDL in the current study, there were no statistically significant differences between intervention and control in other clinical parameters. Previous trials of aerobic exercise interventions have also found differences in HDL without changes in other lipids or blood pressure.³⁵ Even so, a reduction in blood pressure was hypothesised, as moderate intensity aerobic exercise interventions of only four days' duration for 40 minutes per day have been shown to produce significant reductions in blood pressure in previous studies of patients with hypertension.^{36,37} A previous meta-analysis has also found significant reductions in blood pressure with aerobic exercise interventions, although changes are usually most marked in hypertensive individuals and less so in normotensive individuals.¹⁸ The mean blood pressure of participants in the current study was low, so exercise-induced reductions were less likely.

The current study was not specifically powered to detect changes in the secondary clinical outcomes, which were included in a more exploratory capacity. However, non-significant trends in HbA1c and fasting glucose were promising. A larger sample size may have detected these changes as statistically significant. HbA1c concentrations in diabetic patients have been shown to decrease with exercise in a previous eight-week training programme.³⁸ A recent meta-analysis has found that structured aerobic exercise pro-

Figure 3. Peak torque (Nm[†]) during right knee extension at baseline and follow-up of participants in the intervention group who completed the study.



(Values are means \pm SE; Intervention group n=9)

* denotes significant change $p < 0.05$

[†] Nm denotes Newton metres

grammes, particularly those training for more than 150 minutes per week, were associated with 0.7% (95% CI 0.8%–0.5%) reduction in HbA1c, which is consistent with the trend in this study.³⁹

Strengths and limitations

Strengths of this study include its real-life local community context, consultation and involvement of local Pacific community, inclusion of culturally relevant popular game-based activities within the intervention, and the use of a rigorous randomised controlled trial study design to assess effectiveness. Anecdotal feedback from participants indicated that they enjoyed the training immensely and would like to continue the training with other members of their community.

One limitation of the study was that the study did not reach its target sample size of 30. The timeframe of the study was constrained by the duration of the project, which was conducted as a University of Auckland summer student project and in conjunction with the Tamaki Transformation Project community initiative. Despite this, significant differences were found in the primary outcomes. Sample size calculations were only

carried out for the primary outcomes. Therefore, this study was likely to be under-powered to detect differences in the secondary (clinical) outcomes. This study was also designed as a preliminary to a subsequent larger study that would investigate longer-term effects of small-sided games, should this small trial demonstrate promising results, which it has.

Blinding was difficult in this trial. However, baseline assessments were carried out prior to randomisation and outcome measures were undertaken according to standardised protocols or using objective measures, such as blood tests. Mean blood pressure, BMI and strength were lower in the control group than in the intervention group at baseline, despite random allocation. This may have influenced the change in outcomes in response to exercise. However, analyses were adjusted for baseline values to help address this. Also, participants were from a small area, which may limit generalisability of findings to the wider Pacific communities in New Zealand.

Implications

The findings from this study may have important implications for improving the health and well-being of Pacific adults living in New Zealand. A larger trial with a longer training period and follow-up would be a more rigorous test of long-term effectiveness of small-sided games for improved fitness, strength and health outcomes. A comparison of small-sided games with individual gym-based programmes would also inform choices about the best exercise promotion strategies to use in the Pacific community. A third gym-based arm of the trial had also been planned, but the small sample size precluded this in the current study. If small-sided games were shown to be as effective as individual exercise programmes, then this would provide strong justification to include small-sided games as an alternative form of exercise training in guidelines for increasing physical activity levels in New Zealand.

References

- Ministry of Health. A portrait of health: key results of the 2006/07 New Zealand health survey. Wellington, NZ: Ministry of Health; 2008.
- Ministry of Health. Healthy eating, healthy action: a strategic framework. Wellington, NZ: Ministry of Health; 2003.
- Sundborn G, Metcalf P, Scragg R, et al. Ethnic differences in the prevalence of new and known diabetes mellitus, impaired glucose tolerance, and impaired fasting glucose. Diabetes Heart and Health Survey (DHAH) 2002–2003, Auckland New Zealand. *N Z Med J*. 2007;120(1257):U2607.
- Despres JP, Lamarche B, Mauriege P, et al. Hyperinsulinemia as an independent risk factor for ischemic heart disease. *N Engl J Med*. 1996;334(15):952–7.
- Alberti KGMM, Zimmet P, Shaw J. Metabolic syndrome—a new world-wide definition. A Consensus Statement from the International Diabetes Federation. *Diabet Med*. 2006 May;23(5):469–80.
- Hu FB, Stampfer MJ, Haffner SM, Solomon CG, Willett WC, Manson JE. Elevated risk of cardiovascular disease prior to clinical diagnosis of Type 2 diabetes. *Diabetes Care*. 2002;25(7):1129–34.
- Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of Type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med*. 2002;346(6):393–403.
- Doggrell SA. Metformin and lifestyle intervention prevent Type 2 diabetes: lifestyle intervention has the greater effect. *Expert Opin Pharmacother*. 2002;3(7):1011–3.
- Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of Type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med*. 2001;344(18):1343–50.
- Hu G, Lakka TA, Barengo NC, Tuomilehto J. Physical activity, physical fitness, and risk of Type 2 diabetes mellitus. *Metab*. 2005;3(1):35–44.
- Laaksonen DE, Lakka H-M, Salonen JT, Niskanen LK, Rauramaa R, Lakka TA. Low levels of leisure-time physical activity and cardiorespiratory fitness predict development of the metabolic syndrome. *Diabetes Care*. 2002;25(9):1612–8.
- Zierath JR. Invited review: Exercise training-induced changes in insulin signaling in skeletal muscle. *J Appl Physiol*. 2002;93(2):773–81.
- Eriksson J, Tuominen J, Valle T, et al. Aerobic endurance exercise or circuit-type resistance training for individuals with impaired glucose tolerance? *Horm Metab Res*. 1998;30(1):37–41.
- Miller WJ, Sherman WM, Ivy JL. Effect of strength training on glucose tolerance and post-glucose insulin response. *Med Sci Sports Exerc*. 1984;16(6):539–43.
- Poehlman ET, Dvorak RV, DeNino WF, Brochu M, Ades PA. Effects of resistance training and endurance training on insulin sensitivity in nonobese, young women: a controlled randomized trial. *J Clin Endocrinol Metab*. 2000;185(7):2463–8.
- Ishii T, Yamakita T, Sato T, Tanaka S, Fujii S. Resistance training improves insulin sensitivity in NIDDM subjects without altering maximal oxygen uptake. *Diabetes Care*. 1998 Aug;21(8):1353–5.
- Meltzer S, Leiter L, Daneman D, et al. 1998 clinical practice guidelines for the management of diabetes in Canada. Canadian Diabetes Association. *CMAJ*. 1998;159 Suppl 8:S1–29.
- Whelton SP, Chin A, Xin X, He J. Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. *Ann Intern Med*. 2002;136(7):493–503.
- Shephard RJ, Balady GJ. Exercise as cardiovascular therapy. *Circulation*. 1999;99(7):963–72.
- Lee D-c, Artero EG, Sui X, Blair SN. Mortality trends in the general population: the importance of cardiorespiratory fitness. *J Psychopharmacol*. 2010;24(4 Suppl):27–35.
- Blair SN, Kohl HW, 3rd, Barlow CE, Paffenbarger RS, Jr., Gibbons LW, Macera CA. Changes in physical fitness and all-cause mortality. A prospective study of healthy and unhealthy men. *JAMA*. 1995;273(14):1093–8.
- Begg SJ, Vos T, Barker B, Stanley L, Lopez AD. Burden of disease and injury in Australia in the new millennium: measuring

health loss from diseases, injuries and risk factors. *Med J Aust.* 2008;188(1):36–40.

23. Havlik RJ, Phillips CL, Brock DB, et al. Walking may be related to less vascular stiffness in the Activity Counseling Trial (ACT). *Am Heart J.* 2005 Aug;150(2):270–5.
24. American College of Sports M, American Diabetes A. Exercise and Type 2 diabetes: American College of Sports Medicine and the American Diabetes Association: joint position statement. Exercise and Type 2 diabetes. *Med Sci Sports Exerc.* 2010 Dec;42(12):2282–303.
25. Davey JA. From birth to death. III ed. Wellington, NZ: Institute of Policy Studies, Victoria University of Wellington; 1993.
26. Krstrup P, Nielsen JJ, Krstrup BR, et al. Recreational soccer is an effective health-promoting activity for untrained men. *Br J Sports Med.* 2009;43(11):825–31.
27. Bangsbo J, Nielsen JJ, Mohr M, et al. Performance enhancements and muscular adaptations of a 16-week recreational football intervention for untrained women. *Scand J Med Sci Sports.* 2010;20 Suppl 1:24–30.
28. Canadian Society for Exercise Physiology. Physical Activity Readiness Questionnaire (PAR-Q) Accessed accessed Nov 2006, 2002.
29. Velotron CS 1.5; Racermate. 3016 NE Blakely St, Seattle, WA 98105.
30. Hansen JE, Casaburi R, Cooper DM, Wasserman K. Oxygen uptake as related to work rate increment during cycle ergometer exercise. *Eur J Appl Physiol Occup Physiol.* 1988;57(2):140–5.
31. Metamax B. Cortex. 32 Mitchell St, Darwin, Australia.
32. Borg GA. Psychophysical bases of perceived exertion. *Med Sci Sports Exerc.* 1982;14(5):377–81.
33. Edge J, Hill-Haas S, Goodman C, Bishop D. Effects of resistance training on H⁺ regulation, buffer capacity, and repeated sprints. *Med Sci Sports Exerc.* 2006; 38(11):2004–11.
34. Hill-Haas S, Bishop D, Dawson B, Goodman C, Edge J. Effects of rest interval during high-repetition resistance training on strength, aerobic fitness, and repeated-sprint ability. *J Sports Sci.* 2007;25(6):619–28.
35. Banz W, Maher M, Thompson W, et al. Effects of resistance versus aerobic training on coronary artery disease risk factors. *Exp Biol Med.* 2003;228(4):434–40.
36. Arroll B, Hill D, White G, Sharpe N, Beaglehole R. The effect of exercise episode duration on blood pressure. *J Hypertens.* 1994;12(12):1413–5.
37. Elley R, Bagrie E, Arroll B. Do snacks of exercise lower blood pressure? A randomised crossover trial. *NZ Med J.* 2006;119(1235):U1996.
38. Boule NG, Haddad E, Kenny GP, Wells GA, Sigal RJ. Effects of exercise on glycemic control and body mass in Type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *JAMA.* 2001 Sep 12;286(10):1218–27.
39. Umpierre D, Ribeiro P, Kramer C, et al. Physical activity advice only or structured exercise training and association with HbA1c levels in Type 2 diabetes: a systematic review and meta-analysis. *JAMA.* 2011;305(17):1790–9.

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COMPETING INTERESTS

None declared.

Assessing the effectiveness of cold chain management for childhood vaccines

Nikki Turner MBChB, FRNZCGP, MPH; Athene Laws; Loretta Roberts RGON, PGCert

Immunisation Advisory Centre, Department of General Practice and Primary Health Care, The University of Auckland, Auckland, New Zealand

ABSTRACT

INTRODUCTION: Effective immunisation programmes require a stable cold chain to maintain potency of vaccines from national stores through to delivery sites.

AIM: To assess the effectiveness of the New Zealand cold chain and examine the possible impacts of policy changes over the same time period on cold chain effectiveness.

METHODS: Heat- and freeze-sensitive monitors were attached to 5% of randomly selected childhood vaccines from 2002 to 2008. Six-monthly reports on data collected from monitor cards were collated and analysed to look for changes over time in freeze and heat exposure failures for vaccines.

RESULTS: From December 2002 to June 2008 a total of 21 431 monitor cards were included in vaccines distributed from the national store; 9474 (44.2%) of all cards were returned and 8249 (38.5% of total) were correctly completed. Over this period the percentage of valid returns recorded as heat exposed decreased from 38% to 7% ($\chi^2 371, p < 0.001$); heat failures decreased from 3% to 0.3% ($\chi^2 371, p < 0.0001$); freeze failures decreased from 16% to 2% ($\chi^2 134.228, p < 0.0001$), and overall wastage from 17% to 2% ($\chi^2 163.83, p < 0.0001$), giving estimated annual savings of nearly NZ\$4 million.

DISCUSSION: Significant improvements can be made in cold chain management with resulting savings in vaccine wastage. This study demonstrates that such improvements have been made in New Zealand in recent years. This is likely to be due to a combination of improving equipment, systems, education and training, increased provider attention and quality standards.

KEYWORDS: Vaccination; cold chain; refrigeration; primary health care

Introduction

The term 'cold chain' is defined as the maintenance of vaccines at stable temperatures throughout the process of transportation and storage from site of manufacture through to vaccine administration. Maintaining the vaccine cold chain is an essential part of a successful immunisation programme, because immunological potency of vaccines can be compromised on exposure to extreme temperatures. Retaining stability of vaccine potency from manufacturer through to delivery requires maintenance at every step of a cold chain infrastructure.¹

The World Health Organization guidelines and manufacturers' guidelines all recommend

national schedule vaccines be kept at +2 to +8°C (except oral polio).² Potency cannot be guaranteed when vaccines fall outside the manufacturer's recommended range.¹ Environmental damage by freezing is generally the most significant threat to vaccine integrity, with the most freeze-sensitive vaccine being the hepatitis B vaccine.³ Exposure to freeze damage is a significant problem internationally, with reports of as much as 75–100% of freeze-sensitive vaccine being damaged.⁴

Good cold chain management and reduction in vaccine wastage is an important quality and financial aspect in maintaining an effective national immunisation programme.⁵ Vaccine wastage and its associated costs is a common problem for

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CORRESPONDENCE TO:
Nikki Turner
Director, Immunisation Advisory Centre, Department of General Practice and Primary Health Care, The University of Auckland, PB 92019 Auckland, New Zealand
n.turner@auckland.ac.nz

all immunisation programmes.⁶ For example, a US study conducted in 1998/1999 estimated a national wastage of approximately US\$6–31 million worth of vaccine compromised by cold chain failure or lapses in expiration in the public sector.⁷

When the delivery of vaccines occurs in primary care, breaks in the cold chain are common, particularly with exposure to unacceptably cold temperatures. As many as one quarter of all primary care refrigerators may be freezing vaccines.⁸

Assessing the frequency and causes of vaccine wastage can help to target efforts to reduce vaccine potency failures and minimise unnecessary extra service delivery costs.⁷ New Zealand (NZ) purchases scheduled vaccines nationally, distributes them to regional stores, and from there on to the primary care practices which are the main site of vaccination delivery. Historical cold chain surveys in NZ have shown that around one-fifth of freeze-sensitive vaccines had been cold exposed at some stage along the distribution chain and nearly 8% of heat-sensitive vaccines had been heat exposed.⁹

In December 2002, routine ongoing monitoring of the NZ cold chain between the National Vaccine Store (NVS) and the point of delivery was introduced. Vaccine vial monitors (VVMs) have been used to monitor and measure the adequacy of the cold chain since that time.¹⁰ Five percent of scheduled childhood immunisation vaccine packs have a heat-sensitive monitor (WarmMark[®]) or a cold-sensitive monitor (ColdMark[®]) attached at the NVS, along with a record card.

The aims of this study were to examine the results from the VVMs to assess the effectiveness (in terms of levels of heat/cold exposures and failures) of the NZ cold chain over the time period 2002–2008, and to examine the effect of policy changes during this time on cold chain effectiveness. Throughout this period there were significant changes to policy and education for cold chain management. These were:

- The development in 2002 of the Ministry of Health *National Guidelines for Vaccines Storage and Distribution*.¹¹ These were distributed to all primary care deliverers of the national schedule vaccines in 2003.

WHAT GAPS THIS FILLS

What we already know: Cold chain integrity is important to the maintenance of a quality immunisation programme.

What this study adds: Implementing a range of changes such as improving equipment, systems, education and training, increased provider attention and quality standards in an immunisation programme can significantly improve the cold chain, reduce wastage and make efficiencies in a health budget.

- Training for all Vaccinators and Immunisation Coordinators on the National Cold Chain Audit was provided. This started in 2003 and has been included in training for all new vaccinators since this date and in refresher courses which are required for vaccinators every two years.
- A Ministry of Health initiative in 2004 to 2005 funded the full purchase cost of new pharmaceutical fridges for all general practices delivering childhood immunisations.
- The introduction of the 'Cold Chain Accreditation' process for all providers of the national schedule vaccines was introduced from 2004 to 2005. This is a Ministry of Health initiative for all primary care practices to demonstrate effective management of vaccine stocks in the cold chain, involving a three-yearly practice self-audit followed by a review by an immunisation coordinator.

Methods

Heat- and freeze-sensitive monitors were routinely attached to 5% of randomly selected childhood vaccines packed at the NVS in the ESR (Institute of Environmental Science and Research).

A ColdMark[®] shows exposure to temperatures below 0°C when a clear bulb turns to violet, indicating that vaccine potency has been reduced due to freeze exposure. WarmMark[®] tracks cumulative heat exposure over 10°C and displays this by slowly turning windows on the monitor red. A WarmMarkTM status of Index 2 means that two windows are completely red, indicating that the vaccine potency has been reduced, and effectiveness is in doubt. Each monitor had

a record card attached at the NVS at the ESR. These record cards are required to be filled out at each transport and storage stage up until the administration of the vaccine. The monitor card with completed records is returned to the ESR after vaccines have been delivered or exposed to temperatures significant enough to reduce their potency.

Six-monthly reports on the data collected from the monitor cards were collated and analysed from December 2002 to June 2008. Data was entered into Microsoft Excel and the frequencies of heat/cold exposures and failures were compared over time. These were tested using the chi square for linear trend (χ^2).

Ethical approval was not required because this was an audit on national level, anonymous collated data and did not involve patients.

Results

For the period of December 2002 to June 2008 a total of 21 431 monitor cards were sent, of which 9474 (44.2%) were returned. Of the returned cards, 8249 (38.5% of the total) were correctly completed and 1229 (5.7% of the total) were incorrectly filled out and therefore not included in the analysis. The most common cause of incorrect completion was the failure to record at every step of the way along the process until the delivery of the vaccine to the patient. The percentage of incorrectly completed returned monitors significantly decreased over the time period. The initial six-monthly audit of the period December 2002 to June 2003 showed 20% of monitors were incorrectly completed, and this reduced over time to 6% in the January to June 2008 six-monthly report ($p<0.0001$).

The percentage of correct returns recorded as heat exposed showed clear seasonal fluctuations, but overall rates decreased from 38% in the December to June 2003 quarter to 7% in the January to June 2008 quarter ($p<0.001$) (refer Figure 1). Not all cases of heat exposure result in heat failure. The frequency of heat failures (classified as Index 2) reduced from 3% in the quarter December 2002 to June 2003 to 0.3% in the January to June 2008 period ($p<0.0001$) (refer to Figure 2).

The percentage of correct returns recorded as freeze failures decreased from 16% in the December 2002 to June 2003 quarter to 2% in the January to June 2008 quarter ($\chi^2<0.0001$) (refer to Figure 3).

The overall percentage of vaccines requiring to be discarded ('wasted') due to cold chain failure decreased from 17% in the quarter December 2002 to June 2003 to 2% in the January to June 2008 ($p<0.0001$) (refer to Figure 4).

The recorded location of cold chain failures is recorded in Figure 5. The most common location was at the site of delivery (the general practice) in overall 49% of cases, followed by in transport for

Figure 1. Percentage of monitors classified as heat exposed

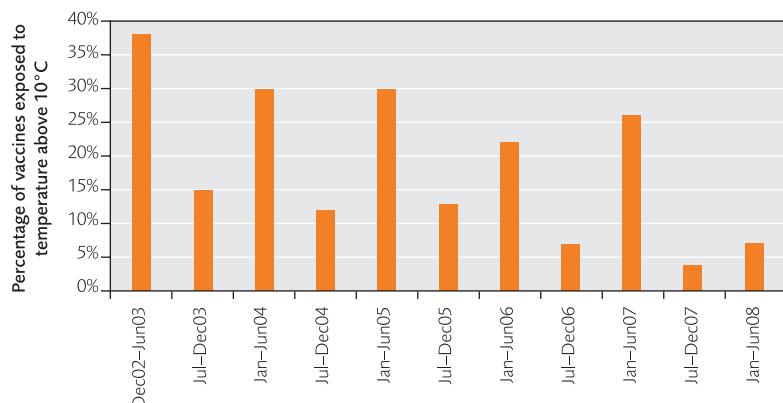
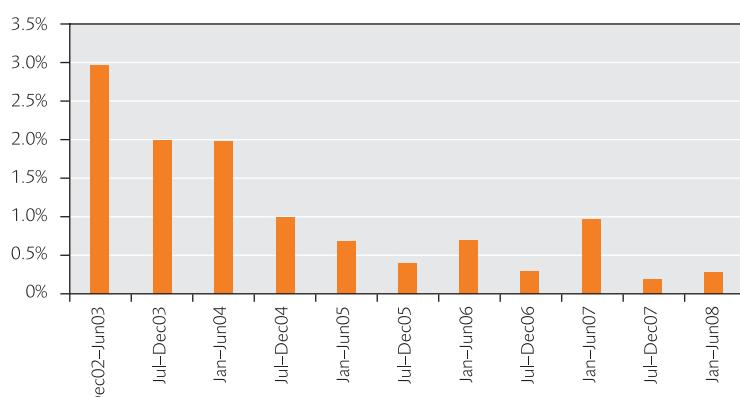


Figure 2. Percentage of monitors classified as heat failure



46% of cases, and at the regional vaccine store in 5% of cases.

From January to June 2008 a total of 428 213 dosages of childhood vaccine valued at NZ\$13 155 300 were distributed. With the reduction in vaccine wastage achieved from December 2002 to June 2008 (a reduction from 17% to 2%) this represents an estimated annual saving of \$NZ3 946 590.

Discussion

This study shows there has been a significant improvement in cold chain management for the national schedule vaccines in NZ from December 2002 to June 2008. This improvement has meant less wastage which equates to an estimated saving of nearly \$NZ4 million a year.

The changes in policy and practice that were put in place during this period were a combination of improved equipment, development and implementation of national standards, provider education and systems for more attention and accountability at the provider level. It is not possible to identify the effects of any individual intervention with certainty. As can be seen in Figures 1–3, the most improvement occurred from July 2004 to December 2006. This was the period when pharmaceutical fridges were purchased for all practices in NZ. However this was also the period when the national *Annual Cold Chain Management Guide*¹¹ was produced and circulated. As there were improvements not just at the provider level, but also with transportation, the overall improvements in the cold chain function are unlikely to have been due solely to the new fridges.

Improvements in cold chain performance over time have been seen in both heat-sensitive and cold-sensitive vaccines. However, it is noteworthy that there continues to be significant seasonal fluctuations seen in the amount of heat exposure occurring every year. On average, heat exposure figures more than double during the summer months (January to June).

The greatest improvements have been seen with freeze-sensitive vaccines. This may have been due

Figure 3. Percentage of monitors classified as freeze failure

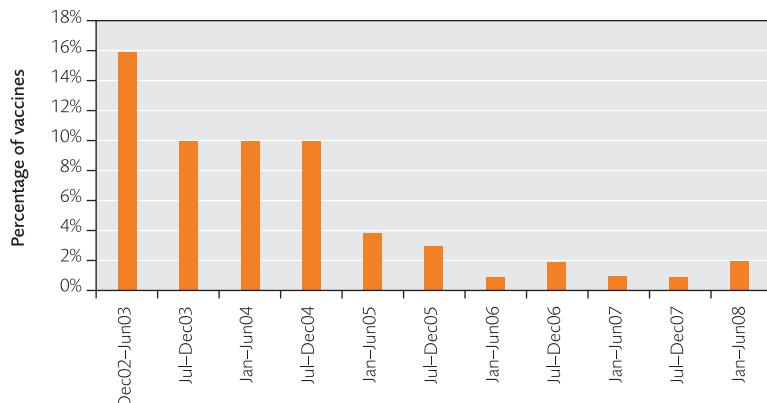


Figure 4. Percentage of monitors recorded as requiring vaccines to be wasted due to cold chain failure

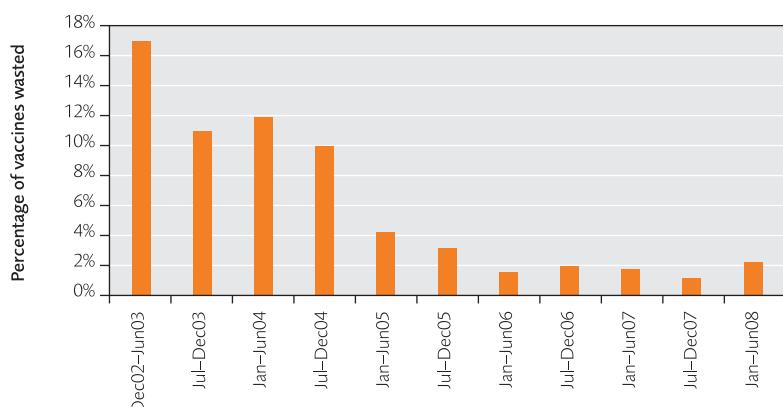
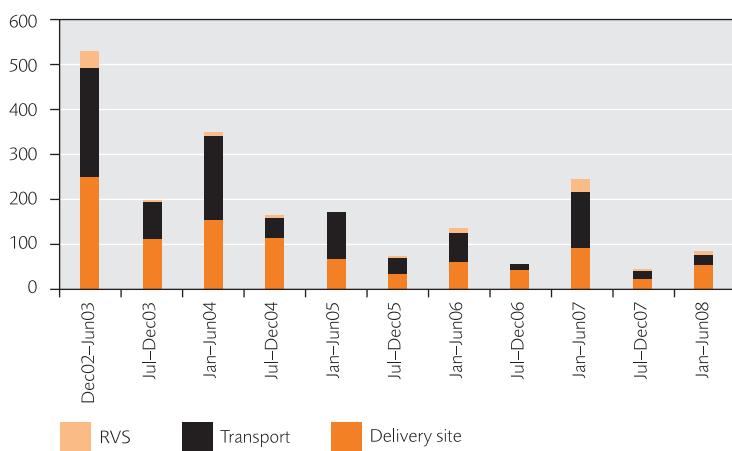


Figure 5. Recorded location of cold chain failure



RVS = Regional Vaccine Store

Transport = transferring between regional vaccine stores to the general practice

Delivery site = primary care site (general practice)

to the fact that pharmaceutical fridges particularly reduce the amount of exposure to temperatures below 0°C. The domestic fridges previously in use were designed to reduce heat exposure in the main and were more effective at this, but less effective at reducing freeze damage.

The major site of cold chain failure continues to be in primary care practices although overall there has been considerable improvement over time. Primary care needs to remain vigilant, as even pharmaceutical fridges can fail and require regular monitoring. The failure rate in transport has decreased even more significantly.

Limitations of the study

The return rate of the monitors sent out with vaccines has been relatively poor throughout the study period, although there have been improvements in the proportion that are correctly completed which is likely due to an emphasis on training and providers becoming more familiar with the use of the monitors. There is also no information on the non-returns, so overall failure rates could be higher or lower than observed in this sample. Because several different interventions took place over the study period, it is not possible to identify which were the most effective in improving cold chain performance.

Conclusions

Significant improvements can be made in cold chain management resulting in considerable savings in vaccine wastage. In NZ this has been demonstrated over a six-year period and is likely to be due to a combination of improving equipment, systems, education and training, increased provider attention and quality standards. Cold chain failures do continue to occur, particularly at the primary care site and in transportation, and this is an area that is worthy of further consideration.

References

- Cherian E. Monitoring the vaccine cold chain. *Arch Dis Child*. 1993;69:600–1.
- World Health Organization. Cold chain and logistics. 1997. [Cited 2011 June]. Available from: <http://www.who.int/vaccines-documents/DoxGen/H5-CC.htm>
- Davaalkham D, Ojima T, Wiersma S, et al. Administration of hepatitis B vaccine in winter as a significant predictor of the poor effectiveness of vaccination in rural Mongolia: evidence from a nationwide survey. *J Epidemiol Community Health*. 2007;61:578–84.
- Matthias DM, Robertson J, Garrison MM, Newland S, Nelson C. Freezing temperatures in the vaccine cold chain: A systematic literature review. *Vaccine* 2007;25(20):3980–6.
- Kamara L, Milstien JB, Patyna M, Lydon P, Levin A, Brenzel L. Strategies for financial sustainability of immunization programs: a review of the strategies from 50 national immunization program financial sustainability plans. *Vaccine* 2008;26:6717–26.
- Duclos P, Okwo-Bele J, Gacic-Dobo M, Cherian T. Global immunization: status, progress, challenges and future. *BMC Int Health Hum Rights*. 2009;9(Suppl 1):1–11.
- Setia S, Mainzer H, Washington ML, Coil G, Snyder R, Weniger BG. Frequency and causes of vaccine wastage. *Vaccine*. 2002;20:1148–56.
- Page SL, Earnest A, Birden H, Deaker R, Clark C. Improving vaccination cold chain in the general practice setting. *Aust Fam Physician*. 2008;37(10):892–6.
- Heffernan H. Vaccine cold chain survey 1999–2000. Porirua, Wellington, NZ: Institute of Environmental and Scientific Research; 2000.
- Samant Y, Lanjewar H, Parker L, Block D, Stein B, Tomar G. Relationship between vaccine vial monitors and cold chain infrastructure in a rural district of India. *Rural Remote Health*. 2007; 7(1)617.
- Ministry of Health. National Guidelines for Vaccines Storage and Distribution. Wellington: Ministry of Health; 2002.

Tax as a motivating factor to make a quit attempt from smoking: a study before and after the April 2010 tax increase

Kirsty MacFarlane K Dip Nutrition;¹ **Janine Paynter** PhD;¹ **Bruce Arroll** MBChB, PhD, FRNZCGP;²
Ben Youdan¹

ABSTRACT

INTRODUCTION: Increasing excise tax on tobacco is one of the most powerful and cost-effective smoking interventions. Despite this evidence, there has been no substantial tax increase in New Zealand between 2000 and 2010. In April 2010 a 10% tax increase on factory-made cigarettes and a 24% tax increase on loose leaf tobacco was implemented.

AIM: To evaluate the effect of cost as a motivating reason for smokers to make a quit attempt before and after the 2010 tobacco tax increase.

METHODS: A regression analysis of a cross-sectional study was conducted. Data were collected from August to October 2009 and compared with data collected in July 2010.

RESULTS: In 2009, 25.5% of smokers cited cost as a reason for trying to quit smoking compared with 55.6% in 2010. The adjusted odds of making a quit attempt with cost as a reason were 3.6 (95% CI 2.3–5.6, $P < 0.001$). Furthermore, smokers were more likely to make a quit attempt in 2010 than in 2009. Thirty percent of smokers made at least one quit attempt in 2009 and 39% made a quit attempt in 2010 (adjusted odds ratio 1.5, 95% CI 0.95–2.3, $P = <0.1$)

DISCUSSION: The recent tax increase on tobacco in New Zealand has resulted in more smokers making an attempt to quit smoking and more smokers identifying cost as a motive for quitting.

KEYWORDS: Smoking; smoking cessation; tobacco; taxes; New Zealand

¹ASH NZ, Auckland,
New Zealand

²Department of General
Practice and Primary Health
Care, The University of
Auckland, Auckland

Introduction

Increasing excise tax on cigarettes is one of the most powerful tobacco control interventions because it results in a reduction in smoking initiation in youths, an increase in quit attempts made by smokers and a reduction in consumption of cigarettes for young adult smokers.^{1–6} There is increasing evidence on the relationship between tax increases and cigarette consumption.^{7–13} A 10% increase in tax on tobacco has an estimated 5–8% reduction in smoking prevalence and this effect is even greater for young people, being more price sensitive than adult smokers.^{5,7,14} The increased revenue could potentially be used to maintain effective tobacco control measures, including

support for smokers who are quitting¹ or in other public health arenas. This makes raising excise tax the most cost-effective intervention in smoking cessation.^{15–24}

Common motivators for quitting smoking are personal health, cost, for someone else's benefit, and vanity.^{23,25} Motivation alone is not always adequate in remaining smoke free²³—the effect of a trigger such as an increase in cost or a health scare gives an immediate incentive to make a quit attempt.²⁵

Quit attempts are a valuable measure for smoking cessation and are in line with the NZ Govern-

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CORRESPONDENCE TO:
Kirsty MacFarlane
PO Box 99126,
Newmarket, Auckland
1149, New Zealand
KMacFarlane@ash.org.nz

ment and Ministry of Health targets.²⁴ Increased quit attempts raises the likelihood of permanently quitting smoking. Cost was explored as a motivator and trigger as it was the only policy change at the time of the study.

This research aimed to study the proportion of smokers who cite cost as a motivating reason to quit smoking since the excise tax increase in April 2010 of 10% on cigarettes and 25% on Roll-Your-Own (RYO) tobacco in New Zealand.

Methods

The method of the study is a regression analysis of a cross-sectional study. Three cross-sectional telephone surveys were conducted by Utting Mills Research (UMR) before the tax increase in 2009 and one cross section was taken after the tax increase in July 2010. This design enabled us to compare self-reported quit attempts and reasons for quitting smoking since the April tax increases on tobacco. The Association of Market Research Organisations (AMRO) New Zealand set out the professional and ethical regulations by which the UMR marketing company abides. Ethical approval was not required because we were provided with anonymous collated data from the UMR Group which obtains ethical approval from AMRO Marketing Research.

Sampling

Cross-sectional samples were obtained from the UMR omnibus telephone survey for the months August, September, October 2009 and for July 2010. The UMR omnibus telephone survey is conducted on a fortnightly schedule and captures a nationally representative sample of New Zealanders over the age of 18 years. This sample included smokers and non-smokers and the survey was organised into 23 telephone directory regions. The number of people over 18 years was determined by cross-referencing with the 2006 Census data from Statistics New Zealand. Quotas were specified accordingly so that an exact number of participants fell into each of the 23 regions. Up to five callbacks were made to reduce the impact of non-response on the representative sample. A random sample of telephone numbers were generated from Telecom's White Pages. A

representative sample of 750 New Zealanders were selected from the respondents from each fortnightly survey.

Variables

Smokers were survey respondents who reported that they smoked more than one cigarette per day. Number of quit attempts were assessed by asking smokers: "In the last three months, how many times did you make a serious effort to quit? By serious I mean you decided that you would try to make sure you never smoked again." There were seven response options which ranged from none up to more than 10 times. For analysis in this report, two categories were compared: none and one or more quit attempts. Motive or reason for quitting was determined by asking: "what was your reason for trying to quit?" and participants were allowed to report up to three reasons. For analysis, cost was prioritised as a reason to quit as it was the main focus; however, the three top reasons were also included for comparison.

Personal income was recorded and the responses were collapsed into low, middle and high income. Low income was no income to NZ\$30 000 per annum, middle income was defined as NZ\$30 001 to \$50 000 per annum and high income was over NZ\$50 000 per annum. Non-response was coded as missing data. Ethnicities were noted and from one to three ethnicities per respondent were recorded. Ethnicity was prioritised for Maori and was made up of either non-Maori or Maori. Non-Maori ethnicities were combined both for clarity and to compare with Maori as Maori have the highest smoking rates in New Zealand.² Age was ordered into five groups based on similar characteristics of an age group. Participants had to be at least 18 years of age. Non-response was coded as missing data. The months of August, September and October 2009 were compared with July 2010. This provided a comparison of before the April 2010 tax increase and after.

Method of analysis

Analysis was done using the Stata IC 10 2010 computer programme. Data checks and statistics

were undertaken for all variables. Two multiple logistic regression models were used to investigate if a correlation between the variables existed. The first model included all daily smokers and whether or not a quit attempt was made as the outcome variable. Ethnicity, gender, age group, year and income were included as explanatory variables. The second model only included daily smokers who reported making a quit attempt. The outcome was citing cost as a reason for quitting and ethnicity, gender, year, income and age were included as explanatory variables.

Results

Response rates

Response rates for the survey varied from 25% to 35% (Table 1). There were 627 daily smokers in 2009 and 115 daily smokers in 2010 (Table 2).

Quit attempts and reasons to quit smoking

The results show that a higher percentage of smokers made a quit attempt in the 2010 compared with 2009. In 2009, for the combined three surveys, 190 (30.3%) smokers made at least one serious quit attempt in the previous three months and, in 2010—which consisted of one survey only—45 (39%) smokers made a serious quit attempt. The adjusted odds of making a quit attempt in 2010 compared with 2009 was 1.5 (95% CI 0.95–2.3, $p=0.08$). This was adjusted for ethnicity, gender, age and income.

Compared with 2009, cost was more likely to be cited as a reason for quitting smoking in 2010 after the tax increased (Table 3). In 2009, 25% of smokers who made a quit attempt cited cost as a motivating factor compared with 55% in 2010. The adjusted odds ratio of cost being cited as a reason in 2009 compared with 2010 was 3.6 (95% CI 2.3–5.6, $p=<0.001$).

Low income earners were significantly more likely to report cost as a reason for making a quit attempt. Seventeen percent of low income earners reported cost as a reason to quit smoking compared to only six percent of high income earners. In 2009, 20% of Maori smokers who made a quit attempt cited cost as the motivating factor to quit

WHAT GAP THIS FILLS

What we already know: Raising excise tax on tobacco is an effective smoking intervention tool that is both cost-effective and powerful—it results in a substantial number of smokers quitting smoking, has no government costs and in fact increases the revenue from smoking to in part compensate for the vast sums spent on smoking-related morbidity and mortality. Quit attempts are a good measure of smoking cessation as an increase in quit attempts relates to an increase in the likelihood of smoking cessation.

What this study adds: This study indicates that the recent tax increase on tobacco in New Zealand resulted in more smokers making an attempt to quit smoking and more smokers identifying cost as a motive for quitting.

Table 1. Response rate

Survey (month)	Call attempts	Response rate n (%)
August 09		
1st call	25 426	8136 (32)
2nd call	26 902	7264 (27)
September 09		
1st call	23 501	7520 (32)
2nd call	23 422	7729 (33)
October 09		
1st call	27 258	8995 (33)
2nd call	20 749	7262 (35)
July 10		
1st call	31 212	7803 (25)

Phone calls were made on a fortnightly basis for each month except for July 2010.

Table 2. Recruitment and sample characteristics

Demographics	2009 n (%)	2010 n (%)
Sample size	4500 (85.7)	750 (14.3)
Male	2154 (47.9)	359 (47.9)
Female	2346 (52.1)	391 (52.1)
Maori	410 (9.1)	86 (11.5)
Non-Maori	4090 (90.9)	664 (88.5)
18–24 years	283 (6.29)	43 (5.7)
25–34 years	736 (16.4)	134 (17.9)
35–49 years	1649 (36.6)	267 (35.6)
50–59 years	686 (15.2)	129 (17.2)
60 and older	1146 (25.5)	177 (23.6)
Smoker	627 (13.9)	115 (15.3)

Table 3. Logistic regression outcome variable: Cost as a reason to quit smoking, comparing the variables of ethnicity, gender, year, income and age

Variable	Total (%) Smokers who made quit attempt	n (%) who cited cost as reason	Crude analysis OR (95% CI)	Crude analysis p value	Adjusted analysis OR (95% CI)	Adjusted Analysis p value
Year						
2009	190 (30.3)	48 (25.5)	1.0 (reference)	–	1.0 (reference)	–
2010	45 (39)	25 (55.6)	4.0 (2.6–6.0)	<0.001	3.6 (2.3–5.6)	<0.001
Ethnicity						
Non-Maori	185	61 (32.3)	1.0 (reference)	–	1.0 (reference)	–
Maori	50	12 (24)	1.8 (1.0–3.2)	0.036	1.5 (0.9–2.8)	0.12
Gender						
Male	101	29 (28.7)	1.0 (reference)	–	1.0 (reference)	–
Female	134	44 (32.8)	1.3	0.26	1.9 (0.6–1.4)	0.7
Income						
Low <\$30 000	96	16 (16.7)	1.0 (reference)	–	1.0 (reference)	–
Middle \$30 000–\$50 000	70	6 (8.6)	0.7 (0.4–1.1)	0.104	0.6 (0.3–1.0)	0.05
High >\$50 000	51	3 (5.6)	0.4 (0.2–0.6)	0.001	0.3 (0.2–0.6)	<0.001
Age						
18–24	22	2 (9.1)	1.0 (reference)	–	1.0 (reference)	–
25–34	57	10 (17.5)	1.6 (0.7–4.0)	0.3	1.9 (0.8–4.9)	0.7
35–49	94	7 (7.4)	0.9 (0.4–2.4)	0.9	1.3 (0.5–3.2)	0.6
50–59	30	2 (6.7)	1.0 (0.4–2.6)	1.0	1.2 (0.5–3.4)	0.7
60+	32	7 (21.9)	0.6 (0.2–1.6)	0.3	0.8 (0.3–2.0)	0.6

smoking and, in 2010, 36.4% of Maori cited cost as a motivating factor.

Discussion

These results show that a higher number of smokers who had not already quit in the previous three months made an attempt to quit smoking in 2010 compared with 2009. Additionally, in 2010 cost was more than twice as likely to be a motivating factor to quit smoking compared with 2009.

Quit attempts are a valuable measure of smoking status because they are associated with decreased tobacco consumption, increased time to first cigarette and decreased overall dependency of tobacco. In one study the number of quit attempts increased as the number of cigarettes decreased.^{26,27} Quit attempts are augmented by

advocacy, health promotion and unequivocal, widely comprehended warnings about the damaging effects of smoking playing an important role in relapse prevention.^{16–18,28,29}

Other reasons given for making a quit attempt were for personal health, for someone else's health, because a doctor/nurse recommended it and due to advertising. The New Zealand Government's strategy to reduce smoking states that increasing quit attempts is an important measure in smoking cessation.²⁴ Increased quit attempts as found in this study in conjunction with cost as a trigger show that not only are smokers still price sensitive, but also that they will make more attempts to quit smoking in response to a tax increase.

The results of this survey are consistent with another New Zealand evaluation of the tax

increase.³⁰ The number of Quitline calls after the April 2010 tax increase was double the number of calls in the previous year. Cost was cited as the second most common reason after health for quitting with 31% of their callers giving cost as the main reason for quitting smoking since the tax increase.³⁰

The effect of the tax increase was the focus for this paper because it was the sole policy change in New Zealand for this period. In 2007, New Zealand was ranked as having the third highest tax rate in English-speaking countries following the UK and Ireland.⁹ In another study, conducted in 2005, New Zealand was ranked 16th in tobacco tax and seventh in tobacco affordability, based on the amount of hours worked in order to buy a packet of cigarettes.²⁶ This was prior to the latest tax increase which would place New Zealand even further up the rank of high tobacco tax. Prior to the increase there had been no tax increase on tobacco in New Zealand for the last decade. Price sensitivity is lowest in developed (4% compared with 8% price elasticity) countries where the price of cigarettes is higher and count for a greater share of the retail price than in developing countries where the absolute price is lower.³¹⁻³⁴ However, as is demonstrated by this study, the effect of a tax increase remains statistically significant, even in a developed country such as New Zealand.

There are a number of issues which arise when tax is increased which need to be addressed in order to have the desired effect of reducing smoking prevalence. Aside from cessation and reduced consumption, various strategies may be used by smokers to avoid financial burden. These strategies include switching to RYO tobacco as a cheaper alternative to tailor-made cigarettes,³⁵⁻⁴⁰ a common strategy used by New Zealand smokers.³⁹ Prior to the 2010 tax increases, RYO tobacco was significantly cheaper than tailor-made cigarettes due to RYO cigarettes being rolled with less than the usual 0.7 g of tobacco per cigarette.^{1,38,41} Consequently the rates of RYO tobacco smokers in New Zealand were higher than in other countries where the price of RYO tobacco is higher.^{39,41} The health risks are the same for RYO and tailor-made cigarettes.^{1,4}

The effect of tax increases specific to Maori showed a greater proportion of smokers made at least one quit attempt in 2010 compared with 2009. It is important that interventions work for all subgroups and preferably better for Maori in order to reduce inequalities.^{1,4}

Strengths and limitations

The low response rate means that the sample population may not be fully representative. Secondly, only smokers were used in this analysis so it did not include ex-smokers who may have quit smoking due to the tax increase. Also, as the results are self-reported, the data is reliant on respondents' honesty. Finally, as the survey was conducted within three months of the tax increase, long-term abstinence from smoking could not be evaluated in regard to the tax increase. The strength of the study is that it is a national sample and, despite the very low 2010 sample size, we still measured a significant difference in the number of quit attempts and motivation. It is likely that this study underestimates the short-term increase in quit attempts due to a tax increase.

Policy and research implications

This study demonstrates that raising tobacco tax is still a powerful and cost-effective measure and should continue as a future intervention to reduce tobacco consumption. It has also been acknowledged in other work that having a specific dedicated tax to help support smokers to quit is advisable.^{2,10} In order to work towards population equality, it is important that there is continuing research on the effect of each sequential tax increase. Secondly, a longitudinal study is required to establish whether cost as a motivating reason for quitting resulted in longer term abstinence from smoking.

Specific primary care implications

As an adjunct to the current primary health strategy on the smoking cessation, especially the 'A, B, C' strategy, raising tobacco tax is a supportive tool in smoking cessation. Secondly, having support tailored specifically for Maori and people of low socioeconomic status may be important because these groups have higher smoking rates.

Conclusion

Since the tax rise in April 2010, cost has become highly significant as a quit instigator and motivator in New Zealand. This demonstrates that increasing tax is a powerful tool which should be maximised in support of smoking cessation both for Maori and non-Maori.

References

- O'Dea D, Thomson, G. Report on tobacco taxation in New Zealand (volume 1). Wellington: Smokefree Coalition and ASH; 2007.
- Debrot K, Tynan M, Francis J, MacNeil A. State cigarette excise taxes. Report: Centres for Disease Control and Prevention; 9 April 2010. Report No.: 59(13).
- Polednak AP. Smoke-free laws and cigarette excise taxes in US states with highest vs lowest adult smoking rates in 2007. *Prev Med*. 2009;49(6):558–559.
- Wilson N, Edwards R, Thomson G. What's new in tobacco tax research for New Zealand and is it time for a tax hike now? *NZ Med J*. 2009;122(1293):89–92.
- Franz GA. Price effects on the smoking behaviour of adult age groups. *Public Health*. 2008;122(12):1343–1348.
- DeCicca P, Kenkel D, Mathios A. Cigarette taxes and the transition from youth to adult smoking: smoking initiation, cessation, and participation. *Health Econ*. 2008;27(4):904–917.
- Reed M, Anderson C, Vaughn J, Burns D. The effect of cigarette price increases on smoking cessation in California. *Springer Journal*. 2008;9(1):47–54.
- Chan M. Tobacco. In: World Health Organization 2011. Geneva: WHO Media Centre; 2010.
- Shafey O, Eriksen M, Ross H, Mackay J. Tobacco atlas. In: The tobacco atlas. Geneva: World Health Organization; 2007.
- Wilson N, Weerasekera D, Edwards R, Thomson G, Devlin M, Gifford H. Characteristics of smoker support for increasing a dedicated tobacco tax: National Survey data from New Zealand. *Nicotine & Tob Res*. 2010;12(2):168–173.
- Hu T, Mao Z, Shi J, Chen W. The role of taxation in tobacco control and its potential economic impact in China. *Tob Control*. 2010;19(1):58–64.
- Ahmad S, Franz GA. Raising taxes to reduce smoking prevalence in the US: A simulation of the anticipated health and economic impacts. *Public Health*. 2008;122(1):3–10.
- Ali M, Koplan J. Promoting health through tobacco taxation. *JAMA*. 2010;303(4):357–358.
- Takei N, Sugihara G. Tobacco tax increase needed in Japan. *Lancet*. 2008;372(9645):1219.
- Jiménez-Ruiz JA, Sáenz de Miera B, Reynales-Shigematsu LM, Waters HR, Hernández-Ávila M. The impact of taxation on tobacco consumption in Mexico. *Tob Control*. 2008;17(2):105–110.
- Wilson N, Thomson G. Tobacco tax as a health protecting policy: a brief review of the New Zealand evidence. *NZ Med J*. 2005;118(1213).
- Polednak AP. Smoke-free laws and cigarette excise taxes in US states with highest vs lowest adult smoking rates in 2007. *Preventive Medicine*. 2009;49(6):558–559.
- O'Dea D, Thomson G. Report on tobacco taxation in New Zealand. The Smokefree Coalition and ASH New Zealand. Nov 2007. pp88.
- Jiménez-Ruiz JA, Sáenz de Miera B, Reynales-Shigematsu LM, Waters HR, Hernández-Ávila M. The impact of taxation on tobacco consumption in Mexico. *Tobacco Control*. 2008;17(2):105–110.
- Carpenter C, Cook PJ. Cigarette taxes and youth smoking: New evidence from national, state, and local Youth Risk Behavior Surveys. *Health Econ*. 2008;27(2):287–299.
- Stoktose A, Skoczyłas A, Rudnicka A, Bednarek M, Krzyzanowski K, Gorecka D. Evaluation of the motivation to quit smoking in outpatients attending a smoking cessation clinic. *Pneumonol Alergol*. 2010;78(3):211–215.
- Weiss C, Hanebuth D, Coda P, Dratva J, Heintz M, Zemp Stutz E. Aging images as a motivational trigger for smoking cessation in young women. *Int J Environ Res Public Health*. 2010;7(9):3499–3512.
- Borland R, Yong H, Balmford J, Cooper J, Cummings M, O'Connor R, McNeill A, Zanna M, Fong G. Motivational factors predict quit attempts but not maintenance of smoking cessation: findings from the International Tobacco Control Four Country Project. *Nicotine Tobacco Res*. 2010;12(1):4–11.
- National health targets: Better help for smokers to quit. Available from: <http://www.moh.govt.nz/moh.nsf/indexmh/healthtargets-targets-tobacco>
- Fagan P, Augustson E, Backinger CL, O'Connell ME, Vollinger RE Jr, Kaufman A, Gibson JT. Quit attempts and intention to quit cigarette smoking among young adults in the United States. *Am J Public Health*. 2007;97(8):1412–1420.
- Zhou X, Nonnemaker J, Sherrill B, Gilseran AW, Coste F, West R. Attempts to quit smoking and relapse: factors associated with success or failure from the ATTEMPT cohort study. *Addictive Behaviors*. 2009;34(4):365–373.
- Ali M, Koplan J. Promoting health through tobacco taxation. *JAMA*. 2010;303(4):357–358.
- Peng L, Ross H. The impact of cigarette taxes and advertising on the demand for cigarettes in Ukraine. *Central Eur J Public Health*. 2009;17(2):93–98.
- World Health Organization. WHO 2010 technical manual on tobacco tax administration. Available from: http://www.who.int/tobacco/publications/tax_administration/en/
- Penny S, Ball D. Tobacco tax increase evaluation—impact on Quitline and Quitline clients. Auckland: The Quit Group; October 2010.
- New Zealand Health Strategy. DHB tobacco control toolkit. Wellington: Ministry of Health; 2001. pp33
- Ahrens D. Tobacco taxes and cigarette consumption in low income populations. *Am J Public Health*. 2009;99(1):6.
- Kelton Jr MH, Givel MS. Public policy implications of tobacco industry smuggling through Native American Reservations into Canada. *Int J Health Serv*. 2008;38(3):471–487.
- Blecher E. Targeting the affordability of cigarettes: a new benchmark for taxation policy in low-income and middle-income countries. *Tobacco Control*. 2010;19(4):325–330.
- Carpenter C, Cook PJ. Cigarette taxes and youth smoking: New evidence from national, state, and local Youth Risk Behavior Surveys. *Health Econ*. 2008;27(2):287–299.
- Kendzor DE, Businelle MS, Costello TJ, Castro Y, Reitzel LR, Cofta-Woerpel LM, et al. Financial strain and smoking cessation among racially/ethnically diverse smokers. *Am J Public Health*. 2010;100(4):702–706.
- Ogilvie D, Gruer L, Haw S. Young people's access to tobacco, alcohol, and other drugs. *BMJ*. 2005;331(7513):393–396.
- Riedel B, Robinson A, Klesges R, McLain-Allen B. What motivates adolescent smokers to make a quit attempt? *Drug Alcohol Depend*. 2002;68(2):167–174.
- Wilson N, Young D, Weerasekera D, Edwards R, Thomson G, Glover M. The importance of tobacco prices to roll-your-own (RYO) smokers (national survey data): higher tax needed on RYO. *NZ Med J*. 2009;122(1305):92–96.
- Lee J-M. Effect of a large increase in cigarette tax on cigarette consumption: an empirical analysis of cross-sectional survey data. *Public Health*. 2008;122(10):1061–1067.
- Laugesen M, Epton M, Frampton C, Glover M, Lea R. Hand-rolled cigarette smoking patterns, compared with factory-made cigarette smoking in New Zealand men. *BMC Public Health*. 2009;194(1).

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Nurses' perceptions of nurse-led healthy lifestyle clinics

Bob Marshall PhD, **Sue Floyd** MN, **Rachel Forrest** PhD

ABSTRACT

INTRODUCTION: Nineteen Nurse-Led Healthy Lifestyle Clinics (NLHLCs) were implemented and targeted Maori, Pacific and people living in high deprivation areas. The general focus of the clinics was on lifestyle issues and much of the nursing was educative and preventative care. The aim of this project was to assess nurses' experiences and opinions of their participation in the clinics.

METHODS: Nurses participating in the clinics were asked to complete a monthly narrative report over five reporting periods, and these were collated and evaluated for emergent themes. Sixteen nurses were subsequently interviewed and the transcripts analysed to identify major themes and sub-themes.

FINDINGS: In total, 167 narrative reports were collected from 53 of the 115 participating nurses. Almost all the nurses either strongly agreed or agreed that they enjoyed working in an NLHLC. This enjoyment was the result of: increased time for in-depth consultations, being able to provide enhanced holistic patient care, developing knowledge, gaining experience, receiving positive patient feedback and the satisfaction of seeing patient improvements. Nurses reported that the opportunity and responsibility of providing holistic nursing care, and the skills and knowledge gained from participating in the project, were extremely valuable.

CONCLUSION: NLHLCs provide benefits for both patient and nurse. For the nurse, job satisfaction is increased through positive patient feedback, opportunities for professional development and a greater feeling of empowerment.

KEYWORDS: Nurse-led clinic; self perception; lifestyle risk reduction; nursing evaluation research

Faculty of Health Sciences,
Eastern Institute of
Technology, Napier,
New Zealand

Introduction

In February 2007, a New Zealand Primary Health Organisation (PHO) initiated the Nurse-Led Healthy Lifestyle Clinic (NLHLC) project in order to reduce inequalities among those populations that are known to have the worst health status, namely Maori, Pacific and people living in high deprivation areas¹ (quintile 5 addresses or NZ Deprivation Index 9–10 decile areas) by providing accessible, affordable and appropriate care.²

A 'nurse-led clinic' was defined as a holistic, patient-focused clinic run by registered nurses in primary health care settings, particularly general practice, Hauora and community providers. The NLHLC project involved 19 healthy lifestyle

clinics which were run across 17 providers (three Hauora, two community and 12 general practices) from throughout the region served by the PHO. Each provider structured clinics according to staff availability and expertise, resource availability, venue suitability and patient demand, which resulted in a wide variety of clinic frequencies and durations. All of the clinics were run on a part-time basis as one component of the nurses' responsibilities. In each clinic the nurses had their own patient caseload and the range of healthy lifestyle clinics included diabetes, smoking cessation, diet/nutrition, women's health, cardiovascular and asthma/respiratory clinics. Patients were referred or invited to the clinic by the nurses or the extended team in which they

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CORRESPONDENCE TO:
Bob Marshall
Professor, Faculty of
Health and Sport Science,
Eastern Institute of
Technology, PB 1201,
Napier 4142, New Zealand
b_marshall@eit.ac.nz

were working. The NLHLCs were free to the PHO-enrolled population who met the inclusion criteria (Maori, Pacific and people living in high deprivation areas). The NLHLC project also prioritised continued nursing education in order to enhance nurses' ability to deliver health care in their clinics.

Research has shown nurse-led clinics (NLCs) are effective in enhancing self-management of disease,^{1,2} are an acceptable alternative to a general practitioner (GP) consultation,^{3,4} provide equivalent care for minor conditions compared to GPs,⁵ and are appreciated by patients for the extended time available for consults.⁶ While NLCs have shown significant improvements in patient outcomes and perceptions of health care both overseas and in New Zealand,⁷⁻¹⁰ there is limited information on nurses' experiences and opinions of their participation in NLCs. Phil-

lips and colleagues¹¹ note, while not referring specifically to NLCs, the many nurses in their study who "expressed frustration at the limited clinical care they were able to provide in general practice". They outline the many skills of experienced nurses which would support more independent practice.

Methods

Two methods were used for collecting data. The first was a content analysis of the narrative reports provided by the nurses, and the second was a thematic analysis of responses to the semi-structured interviews with 16 nurses.

The 115 nurses participating in the clinics were encouraged to complete monthly narrative reports, responding to nine questions (Table 1) about their practice and the clinic processes. Anonymous comments were collected over five reporting periods between 2007 and 2009, collated by question and a content analysis was undertaken by two researchers for emergent themes.

The number of narrative reports completed by a nurse was considered to be indicative of their involvement with the project. Although the narrative reports were anonymous, the number of reports completed by each nurse was available and used to select interview candidates. Within each group of providers, half of the interviewees were chosen because they had not submitted any monthly reports ('uncommitted' nurses), while the remainder were chosen for the relatively large number of reports they had completed ('committed' nurses).

Semi-structured interview questions (Table 2) were developed from the themes identified in the narrative reports. One of the authors (RF) interviewed 16 nurses (four from Maori providers; four from community providers; and eight from mainstream providers) and these were recorded, transcribed and analysed to determine their views of the NLHLC project and to expand upon the narrative reports. Transcripts were analysed independently by two researchers (BM, SF) for emergent themes and subsequently combined and refined. No attempt was made to determine differences between committed and uncommitted nurses.

Table 1. Narrative report questions

1	Do you enjoy working in a nurse-led healthy lifestyle clinic?
2	What is working well for you/what has made your job enjoyable this reporting period?
3	Is anything not working so well?
4	Please describe any barriers (for the enrolled population, for your or for your organisation).
5	Do you have any comments to make on the process or the outcomes of the self-audit you have undertaken of 10% of the people seen in your clinic this reporting period?
6	What nurse-led clinic education sessions would you like to attend in the future?
7	Please detail any continuous quality initiatives you have implemented this reporting period.
8	Can you identify any future opportunities for the nurse-led clinics project?
9	Do you have any other comments/suggestions/feedback for the primary health organisation?

Table 2. Semi-structured interview questions

1	Do you think the Nurse-Led Healthy Lifestyle Clinics have been effective in reducing hospital admissions? Why/how?
2	Do you feel you extended your skills and/or knowledge through participating in this clinic? What sorts of things did you learn? What situations allowed this?
3	What were the main benefits to your patients from these clinics?
4	Did this project have any effect on reducing barriers for some of your patients? What sorts of things helped? Did you initiate those or were they part of the project design? What else might help reduce barriers for your patients?
5	What were the barriers for you in the project? What did you do to minimise them?
6	Did you see patients on repeat visits under other funding schemes (such as Careplus)? How did that work?

The study received ethical approval from the institutional ethics committee and a New Zealand Ministry of Health Ethics Committee.

Findings

“... the main benefits to our patients were that they got health care that they wanted, in the way they wanted it, when they wanted it.” (Nurse 7)

Monthly narrative reports

A total of 167 narrative reports were received from 53 of the 115 participating nurses. The number of responses from each practice varied, with an average of 40% of the nurses completing reports. Approximately 74% of the nurses in the rural/community practices responded, while the response from Maori providers was around 5%, and slightly greater than 40% of nurses in general practices provided narrative reports. As noted below, many nurses found the monthly audits onerous and we hypothesise they felt the same way about the narrative reports. This, combined with workload, may be the factors contributing to the low response rate from some practices.

Overall, nurses were positive about NLCs and either strongly agreed (69%) or agreed (30%) with the question, “Do you enjoy working in a nurse-led healthy lifestyle clinic?”. When asked what worked well or what made the job enjoyable, several themes emerged: time for in-depth consultations, enhanced patient care, developing knowledge, positive patient feedback and patient improvements.

Nurses expressed a great deal of satisfaction in having the time in consults to take a more holistic approach to patient care than usual.

“Having allocated time available to spend with patients in clinic within busy practice setting allows for more holistic patient-centred care.”

Nurses consistently commented on the positive patient feedback they received, as well as the satisfaction of seeing improvements in patients’ conditions and patients taking responsibility for their health. Finally, many nurses commented on how the clinic gave them the opportunity to de-

WHAT GAP THIS FILLS

What we already know: Research has shown nurse-led clinics can provide enhanced patient satisfaction with their care and continuity of care, that care for minor conditions is as safe and acceptable as from doctors, and that they are effective in enhancing self-management of disease.

What this study adds: Nurses' experiences and opinions of their participation in nurse-led clinics demonstrates that these clinics provide nurses with opportunities for professional development and a greater feeling of empowerment.

velop their own knowledge, or gain experience in applying information they had previously gained from in-service courses.

The themes which emerged from question three—“Is anything not working so well?”—included concerns and issues with the computer template being used, continuity of approach and funding, and dissatisfaction with the COOP questionnaire.

Many nurses found the computer template to be both limiting and directive and found the template difficult to apply to a number of areas, such as smoking cessation, cervical screening, asthma and women’s health.

“The [template] is too prescriptive and restrictive. It is mainly around the care plan side. ... My women’s health and respiratory patients do not fit into the care plan at all.”

Across all of the survey periods nurses expressed concern and frustration over the changes in eligibility and continuity of funding.

“I am turning people away as I can’t fund enough.”

However, since there were no changes in funding or eligibility, these comments indicate a problem with the initial introduction of the nurses to the project and the description of the target population. Some nurses voiced frustration at having to choose which patients would receive a funded clinic visit over other, equally deserving, patients who were not part of the targeted population.

The COOP assessment was not popular with many nurses, and several reported how it was a low priority for them. Concerns, as exemplified by the comments below, included the length of time it could take to complete, as well as a lack of understanding or belief in its usefulness.

"I don't use the COOP assessment. I don't find it useful at all."

"COOP assessments can, for some, take a long time. Leaves less time for careplans. I often avoid COOP assessments."

Question four concerned perceived barriers and several new themes emerged, including patients not attending appointments and problems with the availability of clinic appointment times. The number of 'did not attend' patients was an issue for most practices. This was combined with frustration over the target populations being particularly difficult to contact and to encourage to book a clinic visit.

"Target population [is] hard to get to clinic, or they book and do not attend."

Limited availability of clinic times (presumably as a result of staffing or space issues) was an issue for most practices. Many noted the clinic times precluded many patients who were eligible for, and in need of, support. One practice implemented a Saturday clinic in an attempt to become

available to a wider group, while another took a flexible approach to clinic times.

"Clinic is on Wednesday mornings but most people we are targeting are working. Therefore [we are] fitting them into other time slots."

The answers to question five revealed that the requirement to perform monthly audits of 10% of patients polarised the nurses, with some commenting that the monthly audits were too prescriptive and onerous, while others said the audits were useful as a self-check. These two viewpoints are noted below:

"It feels very big brother to me. Already the PHO has the ability to track what I do and don't do in my clinic. I feel I am doing things like COOP assessments just to make the stats look good."

"I do the self-audit on more than 10% of consults as it is helpful to reflect on how I've done things."

However, most nurses commented on the satisfaction of receiving positive feedback from patients about the clinics.

"People appear to really appreciate the clinic. They seem pleased that they do not necessarily need to go straight on medication but can make big changes by addressing lifestyle issues."

Nurses were also asked what other NLC education sessions they would like the PHO to provide in the future. Responses to this question were collated and are presented in Table 3.

When asked to detail any continuous quality initiatives implemented, the themes which emerged included the development of resources or information packs for patients and initiating and developing recall systems for patients.

"This month [I] went to [the] supermarket and did a list of good food and bad foods to give to patients."

"Have made up Healthy Lifestyle packs with basic information about BP, cholesterol, healthy eating, etc."

Question eight asked the nurses to identify any future opportunities for the nurse-led clinics

Table 3. Requests for nurse-led clinic education sessions

Education session	# requests
Healthy eating/weight management	25
Diabetes	21
Asthma	12
Women's health	9
Chronic obstructive pulmonary disease (COPD)	8
Smoking cessation	7
Cardiovascular risk/disease	6
Stress/mental health/motivation/interviewing techniques	5
Lab tests, cholesterol, sexual health, menopause, chronic diseases, social problems, palliative care, elder care, grief, men's health, cultural safety, sleep disorders, cancer, pharmacotherapeutics, exercise, wound assessment	<5

project. While a wide range of suggestions were made, the topics which were consistent across practices and time periods were sexual health, women's and adolescents' health, and respiratory disease/asthma/chronic obstructive pulmonary disease (COPD).

Finally, when asked for any other comments/suggestions/feedback, three general themes arose. The first was that the need for healthy lifestyle clinics in the community is far greater than current availability; the second was that the computer template could be improved substantially, and the third was that the nurses appreciated the opportunity to work in a clinic and appreciated the PHO's support.

"I feel these clinics are a great initiative but feel we are only touching the surface."

"Am really loving being part of the nurse-led clinic experience. Have had positive feedback from patients with significant weight loss and healthy living improvements noted and improved confidence."

Nurse interviews

Semi-structured questions were developed from the narrative responses and 16 nurses were interviewed. Four major themes emerged from the data, each with a number of sub-themes. The major themes were: improved health care; patient empowerment; nurse empowerment; and project concerns.

Improved health care

In general, nurses were passionate and positive about their clinics, and their ability to deliver enhanced health care formed a large part of this attitude. A variety of factors contributed to this improvement, including: reducing some of the barriers to patients accessing health care; time for in-depth consultations and building relationships; development of a holistic approach which was inclusive of family/whanau; development of resources or information packs for patients; and initiating and developing recall systems for patients.

Consistent comments from the nurses related how the clinics reduced barriers to health care for

their patients. One of the obvious influential factors was the removal of charges for attending the clinic, but a number of nurses also commented how removing that cost influenced other factors in a positive way, such as making travel expenses more bearable.

"... it's removed the cost barrier or it's enabled us to provide more for our patients without even incurring costs." (Nurse 2)

"Again, it's the cost of travel as well as having, not having to pay for a doctor's visit as well ... some of our patients actually live about 100km out from here." (Nurse 12)

A number of nurses suggested that making the clinic mobile (i.e. allowing the nurse to go to the patients rather than requiring the patient to come to them) would enable the provision of a better service. However, a few nurses commented that relationships and agreements with other agencies meant that patients with transportation issues could be picked up and brought into the clinic. This inter-agency collaboration allowed for enhanced health care delivery.

"So they'll [another service provider] pick up our patients if we can't reach them [and bring them into the clinic]." (Nurse 1)

The provision of up to an hour per consult was viewed as hugely valuable in developing a relationship with the patient and through that relationship allowing a wide variety of health issues to be discussed. Many nurses commented that the reason for the initial referral to the clinic often turned out to be less important than other issues which, as a result of the relationship which developed between the nurse and the patient, were also able to be addressed.

"I've still got some of the people from my first clinic... 2007 I think it started. She's coming back in January and she was originally referred to me for smoking cessation—we finally might actually tackle that. ... She had other priorities than what her doctor thought she should come to nurse-led clinic for, ... and we've, all in that time frame, we've gradually sorted through them and it's great." (Nurse 13)

Another aspect regarding holistic care was that, during discussions, a concern with another family member would arise and the nurse was able to suggest a course of action for that person. Thus the influence of the clinics became wider than just the immediate patients. As these nurses said:

"You can pick up on things. They can mention something about their son and you think, mmm that doesn't sound right, or maybe you should bring them in and we'll have a look." (Nurse 3)

"If the younger ones can't get to the clinic the older ones are taking the message home and so it's definitely impacting on families." (Nurse 12)

Several of the nurses interviewed (and not just those working with Maori providers) noted that the clinics allowed them to be more culturally sensitive to patients' needs. A large part of this was the time available for discussion, but the lack of formality and talking to someone they felt comfortable asking questions of, also played a role. For example, nurses commented:

"They feel more comfortable, and again, coming here feeling that their cultural needs won't be trampled on." (Nurse 9)

"[It's] the time thing, you know, especially our Maori patients. They like it when they're not rushed ... and then they do have time to say 'look the doctor told me that and I don't get it'." (Nurse 6)

Patients' lack of understanding of their health problems was a common theme. This inhibited care, as the patients often failed to see the connection between their health issue(s) and their actions. Many nurses commented that having the time to discuss and explain health issues frequently gave the patients a better understanding of the role of self-management of their health. The relationship that developed between the nurse and patient allowed the nurse to become a 'health resource' for the patient:

"I am their tool—so they ask me questions and I tell them exactly how and what is happening to them, and they sort of take charge [of their health care needs]." (Nurse 1)

"So there's a relationship [which] gives them a resource, you know an advocate, someone who can not only see them in a clinical situation but can follow them through their journey, you know their health, what do they call it, their health pathway." (Nurse 10)

The development of resources or information packs appeared to be widespread, with some practices initiating contact with other people and groups who may be able to assist with patients. Several nurses described developing and collating information on various diseases which was then made available to patients, usually in printed form. A couple of nurses mentioned attending courses (such as a smoking cessation course) which they thought would be relevant to their clinic role.

One of the interview questions asked if they thought the clinics had reduced hospital admissions. The majority of nurses responded that, while they hadn't seen any hard data indicating that had happened, they believed that providing early and consistent care for health problems which had the potential to become more serious would have an effect of reducing hospital admissions in the future. For example:

"We've managed to support people... that would usually have hospital admissions at least once or twice a winter with either asthma or things ongoing from infection, and we've managed to keep them either out of hospital or have [just] one admission." (Nurse 7)

In particular, nurses noted that attending to patients' cardiovascular risk factors, or issues such as insulin resistance, could significantly alleviate future problems. However, one of the issues in motivating patients was the need to make their health problem 'real' to them, since they are often not physically visible. Nurses noted that linking a discussion of the patient's health with immediate blood test results achieved with 'point-of-care' testing was extremely effective.

"I've found that if you can do point-of-care testing then people have a lot more relationship to the results than if they go off and have the test and get the results back [much later]. So if we can do it

right there and they can see their blood going whizzing round and coming out with this number, I've found that to be a much healthier process for both people because you're moving from talking about something, to finding out some information, to setting up a plan of how to deal with it." (Nurse 7)

Patient empowerment

Another theme which emerged related to patient empowerment. Nurses talked about patient health improvements, positive patient feedback, increased patient responsibility for healthy lifestyle changes, reduced health risk behaviour, and from a negative point of view, patients not attending the clinic. A consistent general theme throughout the interviews was the effect of the clinics on patients' attitudes. This arose from a variety of factors, including the development of a relationship with the nurse, the ability of the nurse to explain aspects of their health issue clearly, and an understanding of the aims and objectives of the care provided.

As with question two, nurses commented on the satisfaction of receiving positive feedback from patients about the clinics. This covered a range of aspects from patients' satisfaction with the clinic itself, to seeing improved responsibility for healthy lifestyle changes and reduced health risk behaviour.

"People appear to really appreciate the clinic. They seem pleased that they do not necessarily need to go straight on medication but can make big changes by addressing lifestyle issues." (Nurse 5)

The development of individuals' responsibility for their health was one of the attitude changes noted by many nurses. Patients would often be resistant or indifferent to proposed care until the condition, lifestyle factors and care were explained. Once they understood the relationship between these aspects, their attitude changed toward their health care.

"Now that we've changed our approach to patients they're more empowered, they're more on board, they're more ready to take responsibility for it and ready to accept treatment for it." (Nurse 2)

"... if you provide people with support then they'll go further and they'll not see things as barriers..."

[but] as just being things that need to be negotiated..." (Nurse 7)

Some of the nurses commented that many of the clinic's patients were from traditionally under-served groups, and that having developed a relationship with one person, they found word-of-mouth recommendations resulted in other members of the whanau/family attending the clinic. One aspect of this appears to be the development of trust/faith in the nurse and then the health care system (perhaps linked to reducing cultural issues), resulting in improved health care for those people. One nurse commented:

"When they [Maori] first come in, you know, [I say to them] I want to work together with you, for you to be able to control this, and they respond to that." (Nurse 1)

Nurse empowerment

A third theme related to how the nurses felt empowered by participating in the clinics. This related to extending their knowledge, gains in confidence, and from the positive feedback received from their patients. Nurses overwhelmingly indicated support for the project from a personal perspective. Through seminars and courses offered by the PHO, they extended their nursing skills and knowledge, including aspects relevant to providing a holistic approach to care. This gain in skills and knowledge, as well as elements related to successes in working with patients, resulted in an enhanced self-image for many nurses. Overall, nurses felt empowered as a result of participating in their NLHLC.

Many nurses commented on how the clinic gave them the opportunity to develop their own knowledge, or gain experience in applying information they had previously gained from in-service courses. An aspect of their knowledge development included gaining an understanding of the resources available to them in dealing with problems, as well as knowledge gained from developing written resources to make available to their patients.

Through courses and seminars provided or funded by the PHO, nurses were able to extend their skills and knowledge. As one nurse commented:

"I feel far better equipped for patients to understand just using one of the diagrams that she's given us ... and they can see immediately what they need to do, It's not just all about diet and exercise." (Nurse 2)

Given the time available in the consultations and the relationships which developed between nurses and their patients, health issues beyond the original referral were often raised. This broadening of the topics gave nurses the opportunity to provide more holistic health care which, in general, they found very satisfying.

"Like, you might have somebody for instance who is a diabetic, comes for a diabetic check but [their] main presenting issue for that person at that time is not their diabetes. And then you can put systems in place, get them linked into the appropriate people ... so we were able to wrap a whole lot of different things around her just from one clinic appointment which diabetes never even got addressed. It was least of her worries." (Nurse 2)

Another consequence of the length of time of the consults, plus the responsibility resulting from the range of nursing care provided to patients, was an enhanced self-image as a nurse. As the two nurses below comment:

"I feel quite empowered by it—I really quite enjoy it. [You] pick up on other sorts of stuff that [have] never been picked up before, because we've had the time. And then you also form this relationship with people and that's quite valuable really." (Nurse 3)

"I love doing this work... because I feel that it's a very honourable way of being a nurse and it's very honourable for patients to be treated in this way." (Nurse 8)

Project concerns

A variety of concerns were expressed. These related primarily to the limitations imposed by funding restrictions on the time available for the clinics, space to conduct them, and the uncertainty of continuation of the clinics. The computer template developed for the project received considerable comment, as did the inclusion/exclusion requirements.

While one of the major positive comments about funding was that the free clinics facilitated health care for under-served groups, the major concern was that the funding was insufficient for the existing need. Every nurse interviewed said they either had waiting lists for appointments, or that they simply couldn't accept all the people who were referred to the clinic. A number of nurses mentioned trying to move patients to another funding stream, where appropriate, after their initial clinic consultation.

The limited availability of clinic times and space in which to run clinics was a concern for most practices. Many noted the clinic times precluded many patients because of work commitments.

"We need to be offering clinics outside of working hours." (Nurse 2)

The computer template continued to generate comments in the interviews. For a number of nurses it was viewed as inappropriate for their clinics, given its [perceived] emphasis on cardiovascular risk. The quotation below illustrates this. However, while the computer template had an initial emphasis on cardiovascular risk, it always had other components, and it developed over time to cater for other clinic specialities such as asthma. This suggests the initial impression of the tool had such a negative effect that some nurses did not then follow its development and missed its later usefulness for their speciality.

"I don't think all that other stuff needs to be in it [the computer template]. There's lots of stuff, there's lots of assessment tools and all that and often, I mean you're just doing cardiovascular risk—that's all they [the PHO] want." (Nurse 16)

Some nurses contrasted their positive impressions of the overall project with a complete lack of support for the tool:

"We had this whole kind of living dynamic process that was possible through the funding project. The way it was set up it was very dynamic and I felt it was quite creative, and then the [computer template] was just so dead and so limited and it was so static." (Nurse 7)

Another area of concern for the nurses related to inclusion requirements for participation in the NLHLC project.

"Well there's funding... for certain people and there are other people here that I deem just as needy, but unfortunately they don't fit into that criteria." (Nurse 6)

Discussion

The aim of this evaluation was to assess nurses' experiences and opinions of their participation in the NLHLC's project. There was a clear perception of the delivery of improved health care for patients in the clinics. The narrative reports and nurse interviews along with the patient satisfaction surveys¹³ all emphatically stated this.

The general focus of the clinics was on lifestyle issues and much of the nursing was educative and preventative care. The potential of the project to produce long-term positive health changes in individuals is large. Increasing understanding of, for example, the risks associated with cardiovascular disease and effecting changes in lifestyle as a result of that, is a vital and necessary component of primary health care. The interviews with clinic nurses and the narrative reports expanded upon this, noting an increase in patients' willingness to take responsibility for their health issues and to be more involved in their treatment. This increase in patient empowerment is a significant outcome of the project.

A number of issues impact on the generalisability of this project. The low response rate from nurses working for Maori providers in completing narrative reports means we do not have a complete picture of their experiences and opinions. Similarly, although compliant and non-compliant nurses (with respect to completion of narrative reports) were interviewed, no specific analysis was undertaken to compare the two groups.

Positive changes in workforce development have been another important result. Nurses reported the opportunity and responsibility of providing holistic nursing care, and the skills and knowledge gained from participating in the project were extremely valuable.

References

1. Salmond C, Crampton P, Atkinson J. NZDep2006 Index of Deprivation. New Zealand Ministry of Health; 2007.
2. Ministry of Health. The Primary Health Care Strategy. Wellington; 2001.
3. Ridsdale L, Kwan I, Morgan M. How can a nurse intervention help people with newly diagnosed epilepsy? A qualitative study of patients' views. *Seizure*. 2003;12:69–73.
4. Ridsdale L. The effect of specially trained epilepsy nurses in primary care: a review. *Seizure*. 2000;9:43–6.
5. Caldow J, Bond C, Ryan M, et al. Treatment of minor illness in primary care: a national survey of patient satisfaction, attitudes and preferences regarding a wider nursing role. *Health Expect*. 2006;10:30–45.
6. Williams A, Jones M. Patients' assessments of consulting a nurse practitioner: the time factor. *J Adv Nurs*. 2006;53(2):188–95.
7. Lloyd-Williams F, Beaton S, Goldstein P, Mair F, May C, Capewell S. Patients' and nurses' views of nurse-led heart failure clinics in general practice: a qualitative study. *Chronic Illness*. 2005;1:39–47.
8. Chandler T. Reducing re-admission for asthma: impact of a nurse-led service. *Paediatr Nurs*. 2007;19(10):19–21.
9. Pagels A, Wang M, Wengstrom Y. The impact of a nurse led clinic on self care ability, disease specific knowledge and home dialysis modality. *Nephrol Nurs J*. 2008;35(3):242–8.
10. Marshall B, Floyd S, Forrest R. Clinical outcomes and patients perceptions of nurse-led healthy lifestyle clinics. *J Prim Health Care*. 2011;3(1):48–52.
11. Phillips CB, Pearce C, Hall S, et al. Enhancing care, improving quality: the six roles of the general practice nurse. *Med J Aust*. 2009;191:92–7.

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COMPETING INTEREST
None declared.

Clinical teachers working in primary care: What would they like changed in the medical school?

Susan J Hawken MBChB, Dip Obs, FRNZCGP, MHSc (Hons);¹ **Marcus A Henning** DipTch, MA, MBus, PhD;²
Ralph Pinnock MBChB, FRACP;³ **Boaz Shulruf** PhD, MPH;² **Warwick Bagg** MBChB, MD, FRACP⁴

¹Department of Psychological Medicine, The University of Auckland, Auckland, New Zealand

²Centre for Medical and Health Sciences Education, The University of Auckland

³Department of Paediatrics: Child and Youth Health, The University of Auckland

⁴Department of Medicine, The University of Auckland

ABSTRACT

INTRODUCTION: General practitioners (GPs) working as clinical teachers are likely to influence medical students' level of community-based learning. This paper aimed to ascertain clinical teachers' views in relation to The University of Auckland about their clinical learning environment.

METHOD: A total of 34 clinical teachers working in primary care contributed to this study. To gauge their level of involvement in teaching and learning, the clinical teachers were asked about issues such as their confidence, available time, sufficient clinical learning opportunities, clear learning objectives to teach students and what they would like changed.

FINDINGS: The GPs appeared confident, felt there were sufficient learning opportunities for students and that their students were part of the team. Less experienced teachers expressed less confidence than more experienced peers. There was some hesitancy in terms of coping with time and feedback. Some clinical teachers were unclear about the learning objectives presented to students.

CONCLUSION: Several issues that emerged—including available time and financial rewards—are difficult to resolve. Curriculum and selection are evolving issues requiring constant monitoring and alignment with increasing numbers of students studying medicine, increased ethical awareness, more diverse teaching systems and more advanced technologies. Non-faculty clinicians need adequate representation on curriculum committees and involvement in clinical education initiatives. Issues of cultural competency and professional development were raised, suggesting the need for more established links between university and GPs.

KEYWORDS: Primary health care; clinical teaching; general practitioners

Introduction

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CORRESPONDENCE TO:
Susan J Hawken
 Senior Lecturer,
 Department of
 Psychological Medicine,
 Faculty of Medical and
 Health Sciences, The
 University of Auckland,
 PB 92019, Auckland,
 New Zealand.
 s.hawken@auckland.ac.nz

General practitioners (GPs) working as clinical teachers are likely to influence medical students' level of community-based learning. There is a growing international literature documenting the interaction between medical students and the primary health care environment^{1,2} and there are some substantive benefits for students wishing to study and further practice in primary care in New Zealand (NZ).³ It has further been documented that half of all NZ GPs are, or have been, involved in teaching,⁴ but 47% report being challenged by lack of time. Furthermore, medical students clearly acknowledge the value

of their general practice interaction as it enables them to witness "excellent communication skills, attitudes, and rapport with patients". Student feedback has also shown the multi-layered role of the general practitioner as teacher and clinician working with a diverse mix of patients.²

The present study extends previous research that focuses on students' views of the general practice teaching environment by qualitatively collating the views of primary care clinical teachers. More specifically, this study asked these teachers about what they would like to change in The University of Auckland Faculty of Medical and Health

Sciences' (FMHS) medical programme. This is an important area of study as GPs are becoming a crucial component of the integrative system of health care,⁵ and involvement from medical schools will likely be instrumental in meeting this synthesis.

The FMHS medical programme (MB ChB) is usually a six-year programme, which includes Year 1 of the Bachelor of Health Sciences or the Bachelor of Science in Biomedical Science. However, graduate applicants may be admitted to Year 2 of the programme, or only complete part of the Year 1 courses, depending on their previous study. During the first three years students concentrate on learning the science that underpins clinical practice, followed by a focus on learning in clinical environments. The final year is a trainee intern year where students are supervised.⁶ The FMHS medical programme is currently faced with an increase in the intake of entrants,⁷ which further motivated the present researchers to consider clinical teachers' needs in terms of faculty support.

Several unique factors make general practice an instructive learning environment for students. Some of the characteristics cited are related to issues of contact (often the first port of call), the ability to work with other professionals and specialists, its patient-centredness, the history of the patient–doctor relationship, the need for effective communication skills, community involvement and time spent working independently in the field, and the holistic nature of the profession.¹ There is also the need for GPs to work actively in partnership with their patients in relation to making clinical decisions about treatment or care.⁸ A further aspect worthy of consideration is the business model of general practice,⁹ which creates a potentially distinctive learning experience for students.¹⁰ These characteristics are unique to general practice and thus make a rich resource and diverse learning environment for medical students. Moreover, it needs to be acknowledged that the service delivery of general practice is undergoing certain changes, such as increased problems with recruitment, increased student numbers, the way in which GPs interact with other service deliveries, and the ageing population of practitioners.^{11–13}

WHAT GAP THIS FILLS

What we already know: Many New Zealand general practitioners (GPs) are involved in teaching medical students in their practice and students clearly acknowledge the value of their general practice interaction, particularly in developing their communication skills, attitudes and rapport with patients. The views of GP clinical teachers are less known.

What this study adds: Some GP clinical teachers would like more clarity around the teaching objectives, teaching guidance and professional development options. Some are limited by time and financial constraints in the teaching they can provide.

An area of university involvement in general practice has been in developing links to improve recruitment to, and retention of doctors in, rural practices,^{14,15} which is an area of particular relevance to the NZ context,^{16,17} especially in terms of developing cultural safety and cultural competence.¹⁸ Some worrying statistics have been reported in relation to the problems encountered by GPs, such as work stress related to excessive paperwork, bureaucracy, multiple problems raised in each consultation, pressure to keep to time and combining work and family.¹⁹ Interestingly, no specific mention was made in relation to teaching commitment and work associated with university. However, these are areas that could have been investigated in more depth in relation to this learning environment.

The present study used a mainly qualitative approach to investigate the views of clinical teachers with respect to their involvement with students in early clinical training. The overarching research question was: "What would clinical teachers like to change about medical school?" The term 'medical school' was chosen as a commonly used generic term.

Method

Procedure

Questionnaires were sent to clinical teachers working in primary care (GPs) who teach Year 4 and Year 5 students in the FMHS medical (MB ChB) programme at The University of Auckland, through an administrator working in the Department of General Practice and Primary Health Care. Questionnaires were anonymously

returned to the researchers via the administrator. The study was approved by The University of Auckland Human Participant Ethics Committee (Ref. 2008/531).

Questionnaire

Clinical teachers were asked to respond to a set of six questions: (1) I feel confident to teach students; (2) I have sufficient time to teach students; (3) learning objectives are clear; (4) there are sufficient clinical learning opportunities for students' needs; (5) feedback was given regularly [to students]; and (6) students feel part of the team. Each item offered five response options (strongly agree, agree, neutral, agree, and strongly agree). These questions were designed by two clinical educators working at The University of Auckland and by considering a student evaluation form used to evaluate the clinical learning environment (the DREEM questionnaire).²⁰ These clinical educators are interested in the nexus between general practice and university, hence there is possibly some bias associated with this design, but equally likely, bias has been minimised due to commonsense pragmatism and detailed clinical

teaching experience. Teachers were also asked about how long they had been teaching (less than 10 years; 10 years or more).

Following on from this, an open-ended question was posed: "If you could change three things about medical school, what would they be?" The notion of three things was mooted to increase the likelihood of a focused response. This open-ended format created a teacher experiential viewpoint and allowed teachers to comment on their teaching experiences in reference to the FMHS at The University of Auckland.

Analysis

Colaizzi's phenomenological method was incorporated²¹ and employed to develop a set of the open-ended commentaries and to create a set of emerging themes. Initially, two educators familiar with the issues facing clinical education read through the commentaries independently to get a sense of the remarks. Subsequently, these two educators met and discussed their ideas to formulate a set of themes, to discuss any differences in interpretation, and to consider the implications of the themes. To ensure a robust system of review and analysis, two additional clinical educators not involved in the original analysis evaluated the significance of the themes.

Findings

Participants

A total of 34 self-selected clinical teachers working in primary care (GPs) contributed to this study. Demographic information such as age, sex,

Table 1. Correlations between the six questions

Questions	Q1	Q2	Q3	Q4	Q5
Q2	0.39*				
Q3	0.24	0.31			
Q4	0.22	0.55 [†]	0.20		
Q5	0.60 [†]	0.36*	0.27	0.35*	
Q6	0.16	0.18	0.17	0.38*	0.08

* p<0.05

[†]p<0.01

Table 2. Clinical teachers' views on teaching: frequency data for each question

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	n (%)				
1. I feel confident to teach medical students		2 (6)	1 (3)	16 (47)	15 (44)
2. I have sufficient time to teach students	2 (6)	6 (18)	10 (31)	15 (44)	1 (3)
3. Learning objectives are clear		3 (9)	8 (24)	17 (50)	6 (18)
4. There are sufficient clinical learning opportunities for students' needs		1 (3)	3 (9)	10 (29)	20 (59)
5. Feedback is given regularly [to students]	1 (3)	2 (6)	5 (15)	16 (47)	10 (29)
6. Students feel part of the team on the rotation			4 (12)	12 (35)	18 (53)

gender and ethnicity were not obtained, primarily to avoid identification of respondents and to protect their anonymity. There was some indication that the sample was a mix of experienced (10 years or more, n=11) versus less experienced (less than 10 years, n=9) teachers, although 14 respondents did not respond to this item. A series of Mann Whitney U tests were conducted to evaluate any potential differences between the emerging and more established clinical teachers across the six items. The results of the test indicate that only one ("I feel confident to teach students") of the six items yielded a significant result, $z=-3.12$, $p<0.01$; teachers with less experience teaching (less than 10 years) had an average rank of 6.39, while more experience teachers (10 years or more) had an average rank of 13.86, indicating a lack of confidence amongst the less experienced teachers.

Responses to the six items

A series of Pearson correlations were conducted between each of the six questions (see Table 1). There were significant positive correlations between questions 1 and 2 ($r=0.39$, $p<0.05$), questions 1 and 5 ($r=0.60$, $p<0.01$); questions 2 and 4 ($r=0.55$, $p<0.01$), questions 2 and 5 ($r=0.36$, $p<0.05$), questions 4 and 5 ($r=0.35$, $p<0.05$) and questions 4 and 6 ($r=0.38$, $p<0.05$). These results suggest that the items are not independent and that certain elements of teaching are inter-related with other elements, although level of causation cannot be inferred. Areas of positive correlation include: (1) confidence and time; (2) confidence and feedback; (3) time and opportunity; (4) time and feedback; (5) opportunity and feedback; and (5) feedback and team involvement.

Responses to the items were collated in terms of count data and row percentages and are presented in Table 2. Clinical teachers responded favourably (agreed) to items 1 (91%), 4 (88%) and 6 (88%). Therefore, this group of GPs appeared to be confident, felt there were sufficient learning opportunities for students, and felt their students were part of the team. However, less experienced teachers expressed less confidence than their more experienced peers.

There was some hesitancy in terms of responses (disagree and neutral) to items 2 (55%), 3 (33%)

and 5 (24%), indicating that there is likely to be a critical number of GPs teaching students who struggle with time and feedback, and are unclear about the learning objectives presented to students.

Commentaries obtained from the open-ended question: "If you could change three things about medical school, what would they be?"

Thematic analysis of the data revealed four significant areas in which respondents identified opportunity for change. These were curriculum issues, time and financial constraints, selection and attitudinal concerns, and professional development. The order in which these themes have been presented was not in any way related to levels of importance as the study was exploratory and inductive and did not aim to create definitive links or levels of causation between ideas.

Curriculum issues

The first curriculum issue raised was in terms of learning objectives which somewhat reinforced the pattern of results shown in Table 2. One participant (P1) commented:

P1: "Learning objectives at present are written up by students but I feel there should be a general framework from the department."

Secondly, two participants (P2 and P3) suggested amendments to the content of the course, and one participant (P4) has suggested earlier exposure to primary care. Additionally, one participant (P5) suggested a change in emphasis with respect to the teaching of Maori health:

P2: "More teaching on consultation skills and dynamics."

P3: "More teaching on medical ethics and the history of medical practice."

P4: "I would start students in general practice from day one of medical school for six months."

P5: "Maori health is important, but must be kept in the valid context of community health status

and needs of non-Maori and ESL [English Second Language] patients."

Time and financial constraints

One participant (P6) echoed the issue of time constraints as inferred from an inspection of the response data presented in Table 2. A further participant (P7) has expressed concern in relation to financial compensation:

P6: "Delegated requirements for delegated time, e.g. 30 mins specifically to teach a student out of a day's schedule."

P7: "Govt/university needs to fund GPs, i.e. need dedicated space and true compensation/payment."

Selection and attitudinal concerns

Three participants (P8, P9 and P10) indicated concerns with respect to the professional attitude of students, the selection process and criteria for selection:

P8: "Professional attitude from some medical students."

P9: "Change the selection process with less reliance on academic achievement and more emphasis on personality and communication skills."

P10: "I would limit the number of female students to 30%."

Professional development

Four participants (P11–P14) expressed a need for teaching guidance and more professional development options. One participant encountered difficulties with adjustment to the notion of biculturalism and the cultural difference of tangata whenua and appears to seek further development opportunities from the university. This comment may echo the concerns of other international doctors working in NZ.

P11: "Teaching seminars and chance to talk to other teachers."

P12: "More written guidance on what to teach..."

P13: "Having only lived in NZ for [a short while and] coming from UK my knowledge of Maori culture is limited. However, working in a community that is 70% Maori my understanding of the common illnesses that affect Maori is quite good. More information from the medical school on what to teach about Maori health/culture would be helpful to me."

P14: "Feedback for staff as well as for students regarding teaching."

Discussion

There are several critical issues that are likely to have important implications for the present and future workforce involving both university and clinical teachers working in primary care. The following discussion will consider each of the following concerns identified in the results section: (1) curriculum issues, (2) time and financial constraints, (3) selection and attitudinal concerns, and (4) professional development.

Curriculum issues

Two issues were raised from the short questionnaires and commentaries, which related to learning objectives and content. Some of the content issues highlighted included more teaching about consultation skills and dynamics, medical ethics, earlier exposure and cultural issues.

The issue of learning objectives is likely to be a communication or training and development problem between clinical teachers and university. The links between university and clinical teachers are constantly being developed²² which is essential for transparent communication between major stakeholders involved in the education of medical students. McKimm and colleagues have stated that the six-year courses running in NZ have two bookends and four middle years that can be equally divided.²² The first of the two-year split focuses on the underpinning sciences while the latter two years concentrate more on the clinical sciences; however the boundaries between underpinning sciences and clinical experience are becoming more indistinct and clinical relevance is occurring earlier in the programmes with respect to increased case-based learning,

e-learning, small group work and fewer lectures. One implication is the importance of creating more learning opportunities in the primary care setting; however, this also entails dealing with the challenges of recruitment and increased student numbers.^{12,13}

Time and financial constraints

Time and financial constraints are two issues that have certain themes that resonate within NZ and overseas as burgeoning problems.^{4,14,19} In this study, time was also found to be positively correlated with confidence and opportunity, suggesting that time allocation for teaching is related to two other crucial areas of teaching. Both of these issues are not easily fixed by university or other administrative bodies. Dowell and colleagues have presented a clear paper indicating that there are numerous confounders to this problem in the form of paperwork, bureaucracy, multiple issues that may arise during consultations and so forth. Furthermore, the cost to the general practitioner may be confounded by year or experience of the trainee.⁹ In an Australian study, financial costs were found to be associated with the training of medical students (\$73.80 per day), but financial benefits associated with the training of junior doctors and registrars. The study authors suggested implementation of a "graduated subsidy rate, reflecting the varied costs of teaching within the stages of medical student training."

One area in which universities can assist is through clear communication about the needs of students and related issues such as assessment.²³ A recent NZ workshop delivered some necessary information to rural GPs that aimed to improve educational proficiency and awareness for a group of doctors who are often isolated from the mainstream.²⁴ Some specific areas covered were ways to work effectively in small groups, how to teach when busy, how to develop appropriate levels of pitch, and employing effective assessment procedures. These initiatives are crucial on several levels such as the provision of information, enabling skill acquisition and creating forums whereby educational issues can be addressed and aired by both general practitioners and university personnel.

Selection and attitudinal concerns

As mentioned in the curriculum issues section, selection of medical students is a vital area of inquiry and has been raised by some of the GP teachers in this study. One problem that has been highlighted in the literature is the vulnerability of general practice in NZ in terms of meeting the needs of the population and the reliance on overseas trained doctors.^{22,25} Poole and colleagues²⁵ have identified that students selected through 'Rural Origin Medical Preferential Entry' scheme (ROMPE) were shown to have a higher interest in general practice than non-ROMPE students, and this level of interest was also observed in relation to students with Maori and/or Pacific Island ancestry. However, this study also showed that students at entry showed a 40% interest while those students at exit showed a 29% interest, indicating an attitudinal change during the study period. The study reported that selection of students based on specific background is fraught with problems, and, therefore, suggested that aspects of curriculum may assist in maintaining a positive attitude to general practice as a viable career option, including building constructive attachment experiences and generating a positive image of general practice within the university system.²⁵

The selection processes used in the medical schools within NZ are well documented.^{22,26,27} Nonetheless, the participants' comments in relation to selection suggest that some GPs do not agree with this system of selection or are unaware of the complexities in developing this process. It is important for universities to develop this dialogue with practitioners and to disseminate valuable information to key stakeholders involved in primary care education. The medical programme has a system for constantly reviewing medical student selection policies²⁸ and the issue is currently being rigorously debated in light of workforce needs, the changing demographics of the population, the ageing population and increasing student numbers with a new invigorated curriculum envisaged for 2013.

The issue of Maori health was raised in two comments and this is likely linked to both selection and attitudinal concerns.²⁹ Maori health is a key domain of medical education.³⁰ The areas

of cultural safety and cultural competence are key requirements of clinical practice,^{18,30} especially in the culturally rich landscape of NZ.³¹ This is further reinforced by selection processes to ensure equitable representation of Maori and Pacific people in the medical programme. At present, up to 24% of the medical student intake is via the Maori and Pacific Admission Scheme.³² Furthermore, to encourage students from regional and rural backgrounds to enter the medical programme, up to 16% of the medical student intake is via the 'ROMPE' scheme.³³ Female students have a greater preference for general practice than their male peers, related to career flexibility.²⁵ There is evidence to suggest that rural immersion programmes do engender an interest in general practice, especially in rural areas, and medical programmes could promote more attractive incentives for students to engage with these types of immersion strategies.³⁴

Professional development

The clinical teachers in this study further emphasised a need for greater professional development initiatives from the FMHS medical programme, and such initiatives will likely be welcomed by the less experienced teacher who expressed less confident ratings than their more experienced peers. 'Teach the teacher' series have been formally implemented overseas^{35,36} and have become an informal activity within the upper North Island³⁷ and elsewhere in NZ.^{24,38} Gallagher and Pullon suggest that such workshops allow an "uncommon opportunity to interact with the university, and to indicate what organisational improvements could be made to enhance their teaching roles".³⁸

Cultural competence is a major issue that needs to be addressed in NZ, given its multicultural society and ethnic diversity.³¹ This may be further exacerbated due to the influx of international doctors^{22,39,40} in particular in rural areas.⁴¹ The notion of cultural competence has been documented by different organisations such as the New Zealand Medical Council and The Royal New Zealand College of General Practitioners.^{42,43} McKimm and colleagues stated that 60% of doctors practising in NZ were trained overseas, and one of the salient problems is that many of these doctors only stay in the country for a short pe-

riod of time, making it difficult for them to gain a deep insight into the complexity of the NZ cultural landscape.²² Therefore, it is imperative that 'teach the teacher' initiatives tackle the issue of professional development in the area of medical education and in particular address the need for all NZ doctors to be culturally competent with a particular focus on improving Maori health.³⁰ In addition, these sessions can incorporate ways to educate and interact with students from different cultural backgrounds to the dominant European way of life, especially given the wide cultural diversity of the medical student cohort.⁴⁴

Feedback was also an area highlighted by the respondents in this study, with one participant requesting more formalised 'written guidance'. Moreover, the responses to the question related to the provision of feedback was positively correlated with confidence, time and team involvement, indicating that the ability to disseminate information is likely related to enhanced confidence and team involvement and may be moderated by the availability of time. One issue of importance is the need to close the loop between teachers, universities and students, so that organisations and individual teachers can learn and develop. Feedback is a well versed concept and practice in medical education.⁴⁵⁻⁴⁷ The impact of feedback will likely influence the individual, and organisation. Archer has developed a new model that can be used to encompass the complexity and contextual nature of the feedback system by considering aspects of culture and focusing on tasks.⁴⁶ In order to meet the needs of clinical teachers there needs to be a way of finding appropriate and effective ways of feeding back on teaching performance and aligning and valuing teaching within the service-driven model.

Limitations to this study

It is important to acknowledge the small size of this study and the fact that it was region specific and thus may not readily be generalisable to other regions in NZ or overseas. We acknowledge that further information could have made the comments more defined, such as demographic data, whether they practise in their own practices or not, or their level of qualification in clinical edu-

cation. However, the confidential and anonymous nature of the survey deterred us from collecting information that could lead to identification. The six quantifiable questions, the probe question and qualitative nature of the study are foundational to further research in this important area of study.

Overall conclusion

The aim of the present study was to collect and collate the views of clinical teachers working in primary care with students from the FMHS medical programme. The probe question aimed to elicit useful comments from clinical teachers that could inform further development and enhancement of the medical programme and develop the relationship between the university and GPs.

The commentaries and questionnaire responses affirmed the need for further cohesion between this university and the GP teachers. Several perennial and burgeoning issues emerged from the findings. One area of concern that is not easily resolved is around time and financial rewards, as documented previously.⁴ Other issues in the areas of curriculum and selection are evolving issues that require constant monitoring and alignment with increasing numbers of students studying medicine,⁷ increased ethical awareness,⁴⁸ more diverse teaching systems⁴⁹ and more advanced technologies.⁵⁰ A way forward is to ensure that non-faculty clinicians have adequate representation on curriculum committees and more involvement in formal⁵¹ and informal³⁷ clinical education initiatives. Lastly, issues of cultural competency and professional development were raised and suggest more established links between the university and GPs.^{24,37}

References

1. Haffling AC. Medical students in general practice: Students' learning experiences and perspectives from supervisors and patients [Faculty of Medicine Doctoral Dissertation Series]. Lund, Sweden: Lund University; 2011.
2. Van der Zwart J, Hanssen V, Zwieriing P, Muijtjens A, Van der vleuten C, Metsemakers J, et al. Workplace learning in general practice: Supervision, patient mix and independence emerge from the black box once again. *Med Teacher*. 2010;32(7):294–9.
3. Noonan T, Arroll B, Thomas D, Janes R, Elley R. When should I do rural general practice? A qualitative study of job/life satisfaction of male rural GPs of differing ages in New Zealand. *NZ Med J*. 2008;121(1283):59–67.
4. Pullon S, Lum R. Clinical teaching capacity in New Zealand general practice. *NZ Med J*. 2008;121(1268).
5. Rea H, Kenealy T, Wellington J, Moffitt A, Sinclair G, McAuley S, et al. Chronic care management evolves towards integrated care in Counties Manukau, New Zealand. *NZ Med J*. 2007;120(1252).
6. The University of Auckland: Faculty of Medical and Health Sciences. Bachelor of Medicine and Bachelor of Surgery (MB ChB). n.d. [cited 2011 February 6]. Available from: <http://www.fmhs.auckland.ac.nz/faculty/undergrad/mbchb/mbchb.aspx>.
7. New Zealand Medical Students' Association. Increase in medical school places welcomed, but retention still an issue, says Students' Association, New Zealand. 2008 [updated October 1; cited 2011 February 7]. Available from: <http://www.medicalnewstoday.com/articles/123794.php>.
8. Elwyn G, Edwards A, Gwyn R, Grol R. Towards a feasible model for shared decision making: focus group study with general practice registrars. *BMJ*. 1999;319(7212):753–6.
9. Laurence CO, Black LE, Karon J, Briggs NE. To teach or not to teach? A cost-benefit analysis of teaching in private general practice. *Med J Aust*. 2010;193(10):608–13.
10. Pegram RW. General practice: who's paying the piper? *Med J Aust*. 2005;183(2):94.
11. Swain AH, Hoyle SR, Long AW. The changing face of prehospital care in New Zealand: the role of extended care paramedics. *NZ Med J*. 2010;123(1309).
12. Zurn P, Dumont JC. Directorate for Employment LSAHC, editor. Health workforce and international migration: can New Zealand compete? Paris, France: Organisation for Economics Co-operation and Development; 2008. [cited]. Available from: http://www.who.int/hrh/migration/Case_study_New_Zealand_2008.pdf.
13. Thomson J, Anderson K. Vertical integration. *Aust Fam Physician*. 2009;38(11):907–10.
14. Wordsworth S, Skatun D, Scott A, French F. Preferences for general practice jobs: a survey of principals and sessional GPs. *Br J Gen Pract*. 2004;54(507):740.
15. Wilkinson D, Symon B, Newbury J, Marley JE. Positive impact of rural academic family practices on rural medical recruitment and retention in South Australia. *Aust J Rural Health*. 2001;9(1):29–33.
16. Goodey-Smith F, Janes R. New Zealand rural primary health care workforce in 2005: more than just a doctor shortage. *Aust J Rural Health*. 2008;16(1):40–6.
17. Hill D, Martin I, Farry P. What would attract general practice trainees into rural practice in New Zealand? *NZ Med J*. 2002;115(1161).
18. Dowell A, Crampton P, Parkin C. The first sunrise: an experience of cultural immersion and community health needs assessment by undergraduate medical students in New Zealand. *Med Education*. 2001;35(3):242–9.
19. Dowell AC, Coster G, Maffey C. Morale in general practice: crisis and solutions. *NZ Med J*. 2002;115(1158).
20. Roff S. The Dundee Ready Education Environment Measure (DREEM): A generic instrument for measuring students' perceptions of undergraduate health professions curricula. *Med Teacher*. 1997;19(4):295–9.
21. Sanders C. Application of Colaizzi's method: interpretation of an auditable decision trial by a novice researcher. *Contemp Nurse*. 2003;14(3):292–302.
22. McKimm J, Wilkinson T, Poole P, Bagg W. The current state of undergraduate medical education in New Zealand. *Med Teach*. 2010;32(6):456–60.
23. Kogan J, Holmboe E, Hauer K. Tools for direct observation and assessment of clinical skills of medical trainees: a systematic review. *JAMA*. 2009;302(12):1316–26.
24. University of Otago. Rural medical immersion programme. 2011 [updated June 17; cited 2011 June 28]. Available from: <http://rmip.otago.ac.nz/>.

25. Poole P, Bourke D, Shulruf B. Increasing medical student interest in general practice in New Zealand: where to from here? *NZ Med J.* 2010;123(1315):12–9.
26. Collins J, White G. Selection of Auckland medical students over 25 years: a time for change? *Med Educ.* 1993;27(4):321–7.
27. Shulruf B, Hattie J, Tumen S. The predictability of enrolment and first year university results from secondary school performance. *Stud High Educ.* 2008;33(6):685–98.
28. Poole P, Moriarty H, Wearn A, Wilkinson T, Weller J. Medical student selection in New Zealand: looking to the future. *NZ Med J.* 2009;122(1306):88–100.
29. McKimm J. Current trends in undergraduate medical education: program and curriculum design. *Samoa Med J.* 2010;1(2):40–8.
30. Jones R, Pitama S, Huria T, Poole P, McKimm J, Pinnock R, et al. Medical education to improve Maori health. *NZ Med J.* 2010;123(1316):113.
31. Statistics New Zealand. 2006 Census data—QuickStats about culture and identity—Tables. 2006 [cited 2011 April 15]. Available from: <http://www.stats.govt.nz/>.
32. The University of Auckland. Maori and Pacific Admission Scheme. 2011. [cited 2011 June 28]. Available from: <http://www.fmhs.auckland.ac.nz/faculty/undergrad/mapas.aspx>.
33. The University of Auckland. Regional/rural preferential entry scheme. 2011. [cited 2011 June 28]. Available from: <http://www.fmhs.auckland.ac.nz/faculty/undergrad/rope.aspx>.
34. Poole P, Bagg W, O'Connor B, Dare A, McKimm J, Meredith K, et al. The Northland Regional-Rural program (Pukawakawa): broadening medical undergraduate learning in New Zealand. *Rural Remote Health.* 2010;10:1254.
35. Arena G, Arnolda L, Lake F. Addressing the needs of clinical teachers: action research. *Clin Teach.* 2008;5(3):148–53.
36. Lake FR. Teaching on the run tips: doctors as teachers. *Med J Aust.* 2004;180(8):415–8.
37. Henning M, Hazell W, Shulruf B. Teach the teacher series. Poster presented at the 8th Asia Pacific Medical Education Conference (APMEC), NUS Yong Loo Lin School of Medicine, Singapore; 2011, January 29.
38. Gallagher P, Pullon S. Travelling educational workshops for clinical teachers: are they worthwhile? *Clin Teach.* 2011;8(1):52–6.
39. Jenkins R, Kydd R, Mullen P, Thomson K, Sculley J, Kuper S, et al. International migration of doctors, and its impact on availability of psychiatrists in low and middle income countries. *PLoS One.* 2010;5(2):e9049.
40. Marshall I. Working overseas after training in the UK. *InnovAiT.* 2010;3(8):455–8.
41. Lawrenson R, Nixon G, Steed R, Lawrenson R. The rural hospital doctors workforce in New Zealand. *Rural Remote Health.* 2011;11(1588).
42. Bacal K, Jansen P, Smith K. Developing cultural competency in accordance with the Health Practitioners Competence Assurance Act. *NZ Fam Phys.* 2006;33(5):305.
43. The Royal New Zealand College of General Practitioners. Quality Standards. 2011 [cited]. Available from: <http://www.rnzcgp.org.nz/quality-standards>.
44. Fitzjohn J, Wilkinson T, Gill D, Mulder R. The demographic characteristics of New Zealand medical students: the New Zealand wellbeing, intentions, debt and experiences (WIDE) survey of medical students 2001 study. *NZ Med J.* 2003;116:1183.
45. Gordon J. ABC of learning and teaching in medicine: One to one teaching and feedback. *BMJ.* 2003;326:543–5.
46. Archer JC. State of the science in health professional education: effective feedback. *Med Educ.* 2010;44:101–8.
47. Ende J. Feedback in clinical medical education. *JAMA.* 1983;250(6):777–81.
48. Bore M, Munro D, Kerridge I, Powis D. Selection of medical students according to their moral orientation. *Med Educ.* 2005;39(3):266–75.
49. Fuks A, Boudreau JD, Cassell EJ. Teaching clinical thinking to first-year medical students. *Med Teach.* 2009;31(2):105–11.
50. Scalese RJ, Obeso VT, Issenberg SB. Simulation technology for skills training and competency assessment in medical education. *J Gen Int Med.* 2008;23:46–9.
51. The University of Auckland. The Centre for Medical and Health Sciences Education. 2011 [cited]. Available from: <https://www.fmhs.auckland.ac.nz/faculty/cmhse/default.aspx>.

Patient Dashboard: the use of a colour-coded computerised clinical reminder in Whanganui regional general practices

John McMenamin MBChB FRNZCGP MD;¹ **Rick Nicholson** MB BS Lond, FRNZCGP;¹ **Ken Leech**²

ABSTRACT

INTRODUCTION: Clinical reminders have been shown to help general practice achieve an increase in some preventive care items, especially if they identify a patient's eligibility for the target item, prompt clinicians at the right time, provide a fast link to management tools and facilitate clinical recording. WRPHO has introduced the Patient Dashboard clinical reminder and monitored its impact on health targets.

AIM: This paper reports the impact of a computerised colour-coded clinical reminder on achieving agreed health targets in Whanganui regional practices.

METHODS: Patient Dashboard was developed from previous versions in Auckland and Northland and provided to Whanganui regional practices with Primary Health Organisation (PHO) support. The Dashboard was linked with existing and new clinical management tools which automatically updated clinical records. Data from practices was pooled by Whanganui Regional Primary Health Organisation and target achievement rates reported over 15 months.

RESULTS: Over the initial 15 months of Patient Dashboard use, recording of smoking status increased from 74% to 82% and of alcohol use from 15% to 47%. Screening for diabetes increased from 62% to 74%, cardiovascular risk assessment from 20% to 43%, cervical screening from 71% to 79%, and breast screening from 60% to 80%.

DISCUSSION: Patient Dashboard was associated with increased performance indicators both for those targets which were part of a PHO programme and for targets without additional support.

KEYWORDS: Reminder systems; quality indicators, health care; preventive health services; mass screening

¹Clinical Directors
Whanganui Regional
Primary Health Organisation
(WRPHO)

²IT Consultant Procon Ltd

Introduction

General practice has been tasked with improving clinical practice to achieve against performance indicators.¹ National health targets include immunisation, cardiovascular/diabetes screening and smoking rates,² and Primary Health Organisation (PHO) performance targets add breast and cervical screening.¹ A number of other preventive care items may be provided appropriately in general practice based on New Zealand (NZ) and international guidelines.³ There are regional variations in achieving targets⁴ and interest in innovations that

can improve performance.⁵ The use of reminders in general practice have been shown to improve the provision of some preventive services.⁶ While systematic reviews report only modest gains generally with the use of reminders, larger benefits are reported in some studies.⁷ Computerised reminders are considered to be most effective if they identify a patient's eligibility for the target item, prompt clinicians at the right time, provide a fast link to management tools and facilitate documentation.⁸

This paper describes, in the New Zealand general practice setting, the use of a computerised re-

minder which includes these characteristics. The impact of Patient Dashboard on Whanganui Regional Primary Health Organisation (WRPHO) practice health targets is reported.

Methods

The items included in WRPHO Patient Dashboard were based on those in the regional patient health-check programme previously developed to apply national and international screening guidelines⁹ and included the national and PHO performance health targets. The status of these items was presented as a series of coloured 'traffic lights' which show red for items requiring update, green when complete, and yellow for ongoing surveillance required (Figure 1). Each Patient Dashboard item linked directly to a specific software clinical tool that supported management.

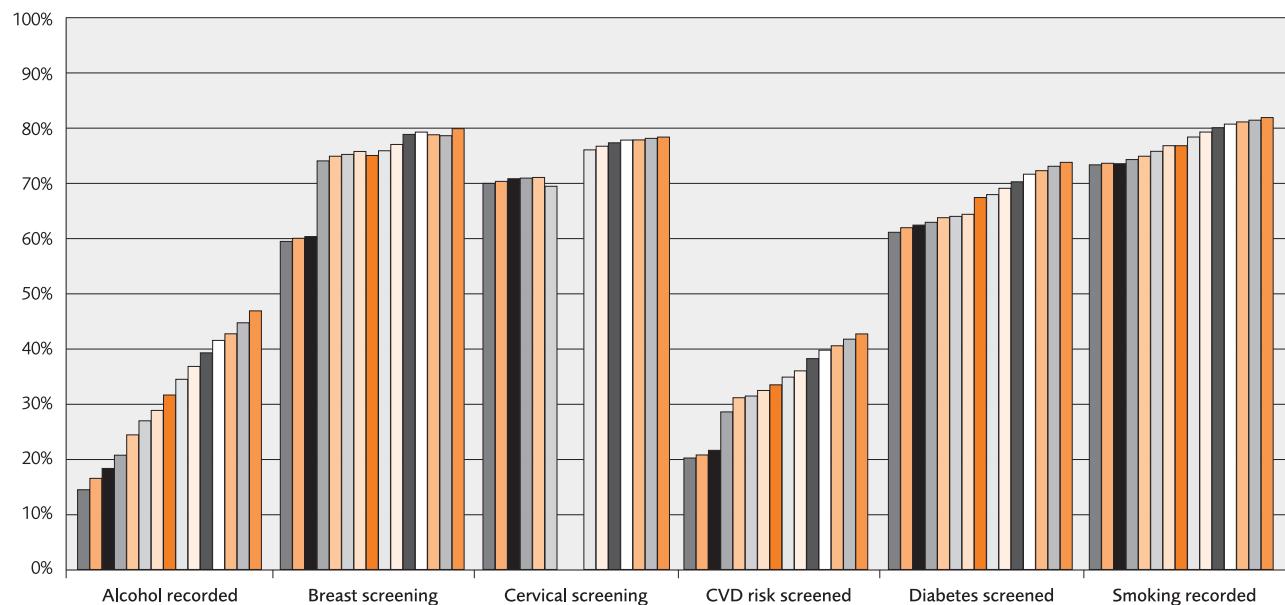
All 35 WRPHO practices except one used Medtech clinical software. Existing clinical management tools were linked to Patient Dashboard where possible, for example to the cardiovascular risk assessment tool. New management tools were developed as part of the WRPHO 'ABC Smoking' and 'ABC Alcohol' programmes. Data recorded using these linked tools were available for

searching at both practice level and as non-identifiable data at PHO level. WRPHO programmes which included patient subsidies were linked by Patient Dashboard to forms which automatically managed service invoicing.

Patient Dashboard was developed locally in 2009 by a clinical and information technology (IT) team based on previous versions used in Auckland and Northland. It was tested in several practices, presented at a regional education meeting by a clinical leader, and then rolled out as a managed project to all regional practices with training and support from WRPHO staff. The introductory version consisted of a display of patient status for smoking, cardiovascular risk, cervical and breast screening, and vaccination for children. Once practitioners gained experience with the use of Patient Dashboard, an updated version was made available which included status for diabetes and alcohol screening, a seasonal reminder for flu vaccination, adult tetanus, and Get Checked status for patients with diabetes.

Of the six screening items included, smoking, alcohol and breast screening were actively supported by a PHO-managed programme (ABC Smoking, ABC Alcohol, and Mobile Mammogra-

Table 1. Monthly screening rates from January 2010 to March 2011



phy), while diabetes, cardiovascular and cervical screening were promoted as targets without organised PHO support.

The impact of Dashboard was measured by the WRPHO audit processes using the Dr Info¹⁰ data report which remotely searches practice software for recorded clinical information to report monthly on agreed targets. These data are reported back to practices for peer group review, and can be checked for accuracy within the practice by comparison with an internal data search.

Results

The impact of Dashboard in WRPHO practices is shown in Table 1. This demonstrates a consistent stepwise monthly increase in each screening item over the 15 months from January 2010. Smoking status increased from 74% to 82%, alcohol use recorded from 15% to 47%, diabetes screening from 62% to 74%, cardiovascular risk assessment from 20% to 43%, cervical screening from 71% to 79%, and breast screening from 60% to 80%.

The impact of PHO programme support is most evident in breast screening, with an increase from 61% to 75% over the two months the mobile mammography service was available, but the subsequent increase to 80% continued after this service finished.

Discussion

Since the introduction of Patient Dashboard, Whanganui regional practices have consistently increased screening for smoking, alcohol, diabetes, cardiovascular risk, and cervical and breast screening over the 15 months reported.

Previously, clinicians were required to identify the status of target items by actively reviewing screening information or recall lists. Alternatively, practices could set up a reminder message box alert for patients meeting specified criteria. This allowed a single-item reminder to flash onto the screen when the clinical notes were first opened. These alerts did not continue to display subsequently, were not linked to management tools or documentation, and required active removal once the item received attention. The development of

WHAT GAP THIS FILLS

What is already known: Clinical reminders in general practice have a modest impact on achieving health targets, with increased benefit likely if the reminder can identify a patient's eligibility for the target item, prompt clinicians at the right time, provide a fast link to management tools and facilitate recording of clinical records.

What this study adds: These characteristics were included in the colour-coded Patient Dashboard clinical reminder introduced into Whanganui Regional Primary Health Organisation practices. Patient Dashboard was associated with increased performance for all health targets.

Figure 1. Screen display example of Patient Dashboard

The screenshot shows a web-based Patient Dashboard interface. At the top, it says 'Patient Dashboard V2 (Whanganui Regional PHO)' and has a 'Web' tab selected. Below this is a 'Clinical Information' section with a note about no medical warnings recorded. The 'Principal priorities' section contains several items with status indicators (red, yellow, green) and due dates: Smoking status (Heavy smoker - 20-39 cigs/day, 26 pack years. Advice given, 06/09/2010), CVD risk (11%, 06/09/2010), Diabetes management (Overdue for annual diabetes check, 02/09/2005), Cervical screening (06/09/2010), Mammography (Mammography recommended, 06/09/2010), and Alcohol (Over guideline or at risk - Review history. Funded brief assessment available if required, 06/09/2010). The 'Secondary priorities' section includes Blood pressure (110/70 Update required, 05/09/2005), BMI (55kg 170cm BMI: 19 Update required, 02/09/2005), and Tetanus (45 year Tetanus not given). The 'Programme information' section shows Care Plus (Meets clinical criteria: Long term conditions).

Patient Dashboard allowed for multiple targets to be reminded, each item being included only for the recommended target group. The status for each item was visually displayed as red, yellow or green throughout the consultation in a screen box which could be modified in size and position according to user preference. Linking the reminders to management tools pre-empted the need to search lists of clinical forms, while the completion of the linked tool resulted in an update of clinical progress notes, classifications and screening information as appropriate.

Three target items (diabetes, cardiovascular risk and cervical screening) received no additional PHO programme support and the increased screening is appropriately attributed to the

introduction of Patient Dashboard. Three other items on Patient Dashboard (smoking, alcohol and breast screening) were supported by PHO programmes (ABC Smoking, ABC Alcohol and Mobile Mammography). The impact of receiving PHO programme support is most evident in the increase in breast screening rates from 61% to 75% during the two-month period mobile mammography was available, although screening rates continued to increase subsequently. Smoking status had been relatively well recorded before the introduction of Patient Dashboard, having been addressed already as a PHO project. Many practices had used the message alert system to remind about smoking and the increase from 74% to 82% reflected the additional gain with Patient Dashboard which also linked to a management tool that automatically updated smoking classification and supported the provision of brief advice and cessation. There had been very little formal recording of alcohol status before the introduction of Patient Dashboard, and the associated Alcohol ABC management tool together with the use of the reminder and the programme support, increased recording of alcohol use from 15% to 47%.

The impact of Patient Dashboard on clinical workload was most associated with the smoking, alcohol and cardiovascular targets. Although recording smoking and alcohol was straightforward, addressing the clinical issues raised took extra time. Completion of a clinical form was needed to change the cardiovascular reminder from red to green. Even with pre-population of items in the form, the process of cardiovascular risk assessment and management took additional time. Previous analysis has shown practices vary in how they manage the increased workload, with some clinicians addressing the target items within consultations, and others in planned health checks.⁹ The implementation of Patient Dashboard was supported by the widespread use of a single provider software (Medtech) throughout the Whanganui region, by IT consultancy and support for the introduction and development of Patient Dashboard and the linked smoking and alcohol advanced forms, by the use of PHO practice facilitators to introduce the software to practices, and programme management for the smoking, alcohol and breast screening.

The increased achievement of targets indicates the value of Patient Dashboard as a reminder in general practice. This tool is now an integral part of clinical practice in the Whanganui region, reminding practitioners which items require attention for the individual patient, and is associated with improvements in achieving health targets.

References

1. PHO Performance Management Programme. Summary information for PHOs. [Cited 2011 Apr 30]. Available from: [http://www.maorihealth.govt.nz/moh.nsf/pagesmh/5817/\\$File/PHOperfmgmtsummaryinfo.pdf](http://www.maorihealth.govt.nz/moh.nsf/pagesmh/5817/$File/PHOperfmgmtsummaryinfo.pdf)
2. Ministry of Health. The health targets. [Cited 2011 Apr 30]. Available from: <http://www.moh.govt.nz/moh.nsf/indexmh/healthtargets-targets>
3. RNZCGP. Preventive care and screening. A systems approach to improving preventive care and screening in general practice. Wellington: RNZCGP; 2001.
4. PHO Performance Results. [Cited 2011 Apr 30]. Available from: <http://www.dhbnz.org.nz/Site/Current-Issues/Performance-Results.aspx>
5. Health Information & Innovations Resource Centre. [Cited 2011 Apr 30]. Available from: <http://www.hiirc.org.nz>
6. Frank O, Litt J, Beilby J. Opportunistic electronic reminders. Improving performance of preventive care in general practice. *Aust Fam Physician*. 2004;33(1–2):87–90.
7. Shojania KG, Jennings A, Mayhew A, Ramsay C, Eccles M, Grimshaw J. Effect of point-of-care computer reminders on physician behaviour: a systematic review. *CMAJ*. 2010;182(5):E216–25.
8. Dexheimer JW, Talbot TR, Sanders DL, Rosenbloom ST, Aronsky D. Prompting clinicians about preventive care measures: a systematic review of randomized controlled trials. *J Am Med Inform Assoc*. 2008;15(3):311–20.
9. McMenamin JP, Handley J. Targeted health checks by nurses in general practice: are they feasible? *NZ Fam Phys* 2005; 32:382–388.
10. Dr Info. [Cited 2011 Apr 30]. Available from: <http://www.drinfo.co.nz>

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COMPETING INTERESTS

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A Pacific immersion programme—is it useful in teaching Pacific health to future doctors in New Zealand?

Faafetai Sopoaga MBChB, FRNZCGP, FNZCPHM

ABSTRACT

BACKGROUND AND CONTEXT: Pacific peoples make up approximately 7% of the total population in New Zealand, and are over-represented in poor health statistics. There are very few Pacific peoples in the health workforce. Most Pacific patients will be seen by a non-Pacific health professional when seeking medical care. It is important for all health education institutions, therefore, to include Pacific health as part of their curricula.

ASSESSMENT OF PROBLEM: This article outlines the development and evaluation of a Pacific immersion programme to teach medical students about Pacific health. The programme was developed with the assistance of local Pacific community leaders. Learning objectives for students, protocols and processes were developed. These learning objectives and feedback from medical students, staff and host families, formed the basis for evaluating the programme.

RESULTS: Students found the programme to be very useful. Host families were satisfied with the experience. Staff support ensured the programme became a required part of learning at the Dunedin School of Medicine.

STRATEGIES FOR IMPROVEMENT: The pilot programme was initially offered as an optional choice for students. In the future, all students at the Dunedin School of Medicine will be expected to undertake the programme. A research project looking at changes in knowledge, skills and attitudes of students after the programme will be of value.

LESSONS: The programme provided a useful way for teaching Pacific health to undergraduate medical students. Other institutions could consider this method for teaching Pacific health in their curricula.

KEYWORDS: Pacific health; health education; Pacific peoples

Senior Lecturer Pacific Health, University of Otago, Dunedin, New Zealand

Background and context

The teaching of cross-cultural competencies has been incorporated in the training of medical students in many countries.^{1–4} Teaching methods used are lectures, workshops, rotations, language training, immersion programmes and other approaches, to enable students to learn about factors that influence the health of people in different ethnic societies.^{5–11} This is of particular importance in communities which are becoming increasingly diverse.

Pacific peoples in New Zealand make up approximately 7% of the total population.¹² There are very few Pacific health professionals working in New Zealand. Less than 3% of all nurses, 1% of medical doctors, and even fewer physiotherapists, dentists and pharmacists identify as Pacific.¹³ Pacific patients are most likely to be seen by non-Pacific health professionals when they seek health care. It is important for health education institutions in New Zealand, therefore, to include the teaching of Pacific health in their curricula. This article

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CORRESPONDENCE TO:
Dr Faafetai Sopoaga
Department Preventive and Social Medicine,
University of Otago,
PO Box 913, Dunedin,
New Zealand
tai.sopoaga@otago.ac.nz

outlines the development of a Pacific immersion programme, and the evaluation of its usefulness for teaching Pacific health to medical students.

Pacific health and health models

'Pacific health' refers to the health of Pacific peoples living in New Zealand. It includes factors such as socioeconomic, cultural, spiritual, environmental influences on health and access to health care. It also looks at other factors that influence health and wellbeing, and the efforts of society to improve health and health outcomes. Pacific peoples are over-represented in poor health outcomes compared to the total New Zealand population.^{14,15} The Government has responded to this by ensuring information is available about Pacific cultural competencies, and '*Ala Mo'ui*' outlines the pathways to health and wellbeing for Pacific peoples.^{16,17} Pacific researchers have also contributed to an understanding of Pacific health and wellbeing in New Zealand. Many health models have been developed to assist in understanding Pacific health, and how to conduct research with Pacific peoples in New Zealand.^{18,19} One of the first models to be described was the 'Fonofale model', developed in 1984.¹⁹ This model has a pan-Pacific approach, and outlines a number of areas that can influence the health of Pacific peoples. These are culture, family, physical attributes, spirituality, mental factors, sexuality, age, gender and socioeconomic status. The environment, time and context for patients are also important factors to consider.

Medical training at the University of Otago

The first medical school to be established in New Zealand was at the University of Otago in 1875.²⁰ The Faculty of Medicine has three medical schools spread over three campuses: Dunedin, Christchurch and Wellington. Students who wish to study medicine at Otago are required to do a competitive health sciences first-year course.²¹ Those who are successful enter the second year of medical training. Two hundred and sixty students are accepted into the second year of a six-year medical course. The second and third years of training are based in Dunedin. Students are divided evenly between three campuses in the final years of training. Those who are not suc-

cessful in getting into medicine after the health sciences first year, can apply again under the 'Graduates' category or in the 'Other' category.²²

Assessment/impetus for the programme

Research at Duke University outlined the importance of involving at-risk communities in the work of training institutions for improved outcomes.²³ An immersion programme at the University of Otago to teach medical students about the health of Maori, the indigenous people of New Zealand, was reported to be useful.⁴ A similar approach had not been explored for the teaching of Pacific health. The development of a new curriculum at the Faculty of Medicine in 2008 provided an opportunity to explore if a similar programme would be useful for teaching Pacific health.

Pacific immersion programme

A pilot Pacific immersion programme was developed in Dunedin which allowed the Pacific community to have input into the teaching of fourth-year medical students. The university consulted the local Pacific community in the development of the programme, which involved medical students spending a weekend with a local Pacific family. The objectives of the programme were to provide the opportunity for students to:

- experience Pacific family life in NZ
- observe and experience how culture, religion and socioeconomic environment influence health
- practise and observe cross-cultural communication
- determine from observations and information shared what could be useful for them in their future practice, and
- learn about factors that influence the health of Pacific peoples from the community.

Community coordinators worked with university staff to develop required protocols and processes. Information developed was translated where required for host families. Students were given relevant information and guidelines about the Pacific group they were to stay with. There were four attachments during the year. Four Pacific

groups took part in hosting the students: Samoans, Cook Island Maori, Tongans and a mixture of smaller ethnic groups (Fijians, I-Kiribati, Tuvaluans and Niueans). Each group was involved once only during the year. Families involved were given a supermarket voucher to assist in the catering of students.

Students were required to complete a reflective essay about the lessons gained from the attachment. They also had the opportunity to provide verbal feedback through debrief sessions with staff after the programme. Fourth-year medical students have had training in consultation skills, and how to obtain information from patients by asking relevant questions. In this context, they were encouraged to observe and compare the similarities and differences to their own upbringing, and how what they observed could be either beneficial or detrimental to health. They were encouraged to participate in host families' activities, and ask questions if there were issues they did not understand. Students were instructed not to offer medical advice to people in the community about their illnesses. If students were concerned about a situation, they were to refer the matter to university staff responsible for the programme. Funding for the programme was made available through the Dean's office.

Method for evaluating the programme

Evaluation of the programme was required to determine its usefulness for teaching Pacific health to medical students. Ethics approval was not required for this purpose. Student essays and debrief feedback were analysed to see if the learning objectives of the programme were met. The students' essays received feedback, but did not contribute to their marks for the attachment. Permission was obtained from students for information provided to be used for reports or publications. Assurance was given that any information used would not identify individuals. Feedback from the Pacific community through community coordinators was taken into consideration. It focused on whether they were satisfied with the experience. It was important to also know whether they would be happy to participate in future programmes. Feedback from staff about the programme was important in the evaluation process. The information sought from staff was

WHAT GAP THIS FILLS

What we already know: Research has outlined the importance of involving at-risk communities in the work of training institutions for improved outcomes. An immersion programme at the University of Otago to teach medical students about the health of Maori has been reported to be useful.

What this study adds: The teaching of Pacific health through an immersion programme to medical students in New Zealand is a new initiative. This is a pilot programme which has enabled the Pacific community to be 'teachers' in the training of medical students.

whether they thought the programme should be incorporated as a required part of the curriculum.

Results

The programme was conducted as a pilot in 2010, and was optional for students. Of the 77 medical students in the fourth-year medical class, one student was of Pacific heritage. Fifty-seven students participated in the programme. All students who took part in the programme reported an appreciation of the opportunity provided for them to learn about Pacific health in this context. Reported below are examples of feedback from students against the objectives of the programme.

Objective 1: Opportunity to experience Pacific family life in NZ

"They were such a welcoming, generous and unfailing friendly people with a really strong sense of culture and community among their ethnic groups."

(Student No. 1, Male)

"The thing that struck me most about my weekend spent with... family was their inclusiveness. From the moment we met... until the moment we kissed goodbye, I was treated like a member of the family."

(Student No. 2, Female)

Objective 2: Observe and experience how culture, religion and socioeconomic environment influence health

"For me, this experience has highlighted several key points and areas between my upbringing and

culture and that of Pacific peoples. These include the family structure, cultural norms and their impact on health behaviours, and the degree of understanding and acceptance of medical concepts.”
(Student No. 3, Male)

“In preventative and social medicine we are taught, frequently, about the social determinants of disease, with the Dahlgren and Whitehead diagram repeated ad nauseam. So whenever I see that diagram I tend to switch off without giving it more than a cursory glance. But this weekend I gained a true insight into the real social determinants of health, disease and wellbeing.” (Student No. 4, Female)

“When I think about my own upbringing/lifestyle it confirms to me how fortunate I have been to many of the above factors (income, poverty, employment and occupation, education, housing...). I attended... school... and... college... Both are decile 10 which means they are among the 10% of schools with the lowest proportion of their students from the lower socioeconomic communities... my parents both work... where employment contracts are very reasonable and their income is steady...”
(Student No. 5, Male)

“I learned the massive importance of one’s social and spiritual health. People from the... community value friends and their faith often higher than their own personal needs, and I know now how essential it will be to enquire about their total feeling of wellness, not just their physical health.”
(Student No. 6, Female)

“She also said that traditionally... a prayer would be said when beginning the consultation with a doctor and before treatment would begin. I had never considered that doctors might pray with their patients. General ignorance of... spiritual needs in the health care system may be a reason why... do not access health care as much as they need to.”
(Student No. 7, Male)

Objective 3: Practise and observe cross-cultural communication

“I believe that I gained a lot from the Pacific immersion weekend, I learned a lot about the traditions and customs of the... community, developed communication skills in overcoming language barriers

and also developed greater insight into the health issues that are concerning the community as well.”
(Student No. 8, Male)

“I have come to realise that quality communication is an underestimated health determinant. I always knew that communication was important, especially when patients do not speak English, a translator may be necessary. However, there is a lot more to communication than just speaking the same language.” (Student No. 9, Female)

Objective 4: Determine from observations and information shared, what could be useful for them in their future practice

“This programme has helped me realise that as a future member of the health profession. I have a responsibility to improve Pacific health outcomes and reduce inequalities.” (Student No. 10, Male)

“I am very grateful for the opportunity, and feel there is no better way to learn about a culture, than by experiencing it first-hand.” (Student No. 11, Female)

“We all need to be culturally aware and sensitive to the needs of all our patients regardless of whether they are a minority group or not. I hope that the special knowledge I have gained from this weekend will help me to do just this in my future practice.”
(Student No. 12, Female)

Objective 5: Learn about factors that influence the health of Pacific peoples from the community

“I have heard repeatedly in lectures of how different aspects of Pacific culture could affect the delivery of health care, but I wasn’t sure how true it was for the average Pacific Islander. This scepticism evaporated when I listened to my host father as he described his people and their relationships with doctors.” (Student No. 13, Male)

“For my Pacific immersion experience I was heartily welcomed into a family with a connection to Kiribati. I had no previous knowledge of the Kiribati islands, couldn’t even locate them on a map, but over the course of the weekend I came to learn a little bit about what it’s like to be a migrant to New

Zealand from a small island community.”
(Student No. 14, Female)

Feedback from local communities through community coordinators indicated everyone was satisfied with the programme. Host families felt what they had to share was valued and this was greatly appreciated. Medical students had a positive impact as they were seen to be good role models for young people in the community. All host families were happy to be involved again in future programmes.

The Dean of the Dunedin School of Medicine and senior staff members attended some of the attachments. Everyone endorsed the Pacific Immersion Programme as a valuable learning experience for students and agreed for it to be a required part of learning. Students are motivated to learn subjects that have a formal assessment

tion with family and community was important for their overall wellbeing.²⁵ Pacific peoples who have a strong connection to a community group were less at-risk. Those, however, who were not as well connected to a community group, church or other network of support were often the ‘hard-to-reach’ groups and were the ones most at-risk.

Students, through their essays and feedback at debrief sessions, were able to observe and identify many issues that impacted on Pacific peoples’ health. These included income, employment, education, housing, transport, smoking, diet and nutrition. Some also observed that, whilst the community was a close-knit group, there were some—particularly the elderly—who were lonely and felt displaced. Depression was observed as an important issue for young people, and suicides had affected some host families in recent times.

This unique opportunity helped students observe and experience the context for Pacific peoples in New Zealand, the complexities of Pacific families, the impact of cultural and environmental factors and the opportunities they have to make a difference in the future.

component.²⁴ The Pacific Immersion Programme will be included as an examinable part of the medical curriculum for students.

Discussion

This unique opportunity helped students observe and experience the context for Pacific peoples in New Zealand, the complexities of Pacific families, the impact of cultural and environmental factors and the opportunities they have to make a difference in the future. Some students were anxious initially because what they knew of Pacific peoples was through the ‘news media’, and it all seemed to be ‘bad news’. The opportunity provided opened the eyes of students to many issues they would not have understood in the context of class lectures. Students also observed positive factors that influenced health and wellbeing. Pacific peoples are migrants, and having a strong connec-

The Pacific Immersion Programme provided a way to engage the community in the work of the university. There were also benefits for the local community from involvement in the programme. Community coordinators and staff felt this programme provided a basis for developing further working relationships and collaborations in the future.

Lessons and messages

The Pacific Immersion Programme was explored as a method to teach Pacific health to medical students in New Zealand. Students reported it was very useful in helping them learn about the context for Pacific peoples in New Zealand, and how best to work with them in their future practices. Good communication and working relationships between the local community and the university made the development and run-

ning of the programme a success. The University of Otago will continue to work collaboratively with the local community to strengthen this relationship. The Pacific Immersion Programme could be explored by other health education institutions in New Zealand as a method for teaching Pacific health.

References

- Dolhun EP, Munoz C, Grumbach K. Cross-cultural education in US medical schools: development of an assessment tool. *Acad Med.* 2003;78(6):615–622.
- Taylor JS. Confronting 'culture' in medicine's 'culture of no culture'. *Acad Med.* 2003;78(6):555–559.
- Wachtler C, Troein M. A hidden curriculum: mapping cultural competency in a medical programme. *Med Educ.* Oct 2003;37(10):861–868.
- Dowell A, Crampton P, Parkin C. The first sunrise: an experience of cultural immersion and community health needs assessment by undergraduate medical students in New Zealand. *Med Educ.* 2001;35(3):242–249.
- Crampton P, Dowell A, Woodward A, et al. Utilisation rates in capitated primary care centres serving low income populations. *N Z Med J.* 27 2000;113(1120):436–438.
- Gupta AR DT, Johnston MA. Incorporating multiculturalism into a doctor–patient course. *Acad Med.* 1997;72:428.
- Mao C BC, Harway EC, Khalsa SK. A workshop on ethnic and cultural awareness for second-year students. *J Med Educ.* 1988;63:624–628.
- Esfandiari A DC, Wilerson L, Gill G. An international health/tropical medicine elective. *Acad Med.* 2001;76:516.
- Takayama JI, Chandran C, Pearl DB. A one-month cultural competency rotation for pediatrics residents. *Acad Med.* 2001;76:514–515.
- Godkin M WL. A pathway on serving multicultural and underserved population. *Acad Med.* 2001;76:513–514.
- Dogra N. The development and evaluation of a programme to teach cultural diversity to medical undergraduate students. *Med Educ.* 2001;35(3):232–241.
- Statistics New Zealand. Demographics of New Zealand's Pacific Population. 2006. [Cited 2010 Nov 22]. Available from: http://www.stats.govt.nz/browse_for_stats/people_and_communities/pacific_peoples/pacific-progress-demography.aspx.
- Ministry of Health. Pacific Health and Disability Workforce Development Plan. 2004. [Cited 2010 Nov 17]. Available from: <http://www.moh.govt.nz/moh.nsf/pagesmh/3681>.
- Ministry of Health. The Health of Pacific Peoples. 2005. Available from: <http://www.moh.govt.nz/moh.nsf/pagesmh/3914>.
- Ministry of Health. A portrait of health. Key results of the 2006/7 New Zealand Health Survey. 2008. [Cited 2010 Nov 23]. Available from: <http://www.moh.govt.nz/moh.nsf/0/6910156be95e706e4c2568800002e403?OpenDocument>.
- Ministry of Health and Ministry of Pacific Island Affairs. 'Ala Mo'ui : Pathways to Pacific Health and Wellbeing 2010–2014. 2010. [Cited 2010 Nov 29]. Available from: [http://www.moh.govt.nz/moh.nsf/pagesmh/10007/\\$File/ala-moui-pathways-to-pacific-health-wellbeing2010-2014.pdf](http://www.moh.govt.nz/moh.nsf/pagesmh/10007/$File/ala-moui-pathways-to-pacific-health-wellbeing2010-2014.pdf).
- Tiatia J. Pacific cultural competencies: a literature review. 2008. [Cited 2010 Nov 29]. Available from: <http://www.moh.govt.nz/moh.nsf/indexmh/pacific-cultural-competencies-literature-review>.
- Tu'itahi S. Fonua: A model for Pacific health promotion. Health Promotion Forum of New Zealand: Massey University; 2007.
- Pulotu-Endeman FK. Fonofale Health Model. 2001; pp7. Available from: <http://www.hforum.org.nz/resources/Fonofalem-odelexplanation.pdf>.
- University of Otago. Dunedin School of Medicine —History.
- University of Otago. Health Sciences, Courses and Subjects. 2010. [Cited 2010 Nov 22]. <http://www.healthsci.otago.ac.nz/courses/index.html>.
- University of Otago. University of Otago Calendar. Applications for admission to medicine. 2010. [Cited 2010 Nov 22]. <http://www.healthsci.otago.ac.nz/admissions/micn2011.html>.
- Michener JL, Yaggy S, Lyn M, et al. Improving the health of the community: Duke's experience with community engagement. *Acad Med.* 2008;83(4):408–413.
- Newble D. Assessment. In: Jolly B, Rees L, editors. *Medical education in the millennium*. First ed. Oxford: Oxford University Press; 1998. p.131–142.
- O'Brien GM, Stein MD, Zierler S, et al. Use of the ED as a regular source of care: associated factors beyond lack of health insurance. *Ann Emerg Med.* 1997;30(3):286–291.

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COMPETING INTERESTS

None declared.

Saturated fat has been unfairly demonised

YES

Reading the evidence, there does not appear to be unanimous agreement regarding the role of saturated fatty acids (SFA) in coronary heart disease (CHD) and cardiovascular disease (CVD). The champions who support this hypothesis argue that the evidence is unequivocal. However, the fact that this dogma is not universally accepted suggests that either such affairs of the heart are not entirely correct, or that the issue is more complex than it first seems. Despite the fact that there is widespread conviction that SFA are responsible for a large proportion of the coronary disease burden, current evidence, including systematic reviews and meta-analyses, seem to dispute this.

Common high-SFA foods are butter, coconut cream and some meats, each with their own ratios of various SFA, which in turn have a diverse range of biological functions, with multiple effects on circulating lipids and lipoproteins. Humans adapted to consume milk into adulthood around 10 000 years ago, with the ability to digest lactase beyond infancy arising several times independently; our ancestors traditionally sought out the fattiest organ meats in preference to leaner cuts. Perhaps the reason that not all

roads lead to the proverbial Rome is because SFA have a complex role in human health and accurately capturing this is difficult, not just because of other dietary confounders, but also within individual variability.

Roads that do not lead to Rome—reliance on biomarkers and ecological fallacies

The assumption has been that diets high in SFA lead to high total cholesterol and therefore increase the risk of cardiovascular disease. A 2003 meta-analysis evaluated 60 controlled trials testing the effect of dietary fatty acids on serum lipids and lipoproteins, and concluded that replacing saturated fat with carbohydrate has no effect on total serum cholesterol, cautioning against using cholesterol alone as a marker of disease.¹ By 2010 a review highlighted more questions than solutions about the effect of SFA on serum lipids, particularly raising the risks of their replacement with carbohydrate which can lead to atherogenic dyslipidaemia.²

More directly, people who eat more SFA should also have more CVD than people who follow low fat diets; however, studies looking at dairy

Helen Petousis-Harris

BSc, PGDipSc

Department of General Practice and Primary Health Care, School of Population Health, The University of Auckland Auckland, New Zealand h.petousis-harris@auckland.ac.nz

Petousis-Harris H. Saturated fat has been unfairly demonised —the ‘yes’ case. J Prim Health Care. 2011;3(4):317–319.

While evidence can help inform best practice, it needs to be placed in context. There may be no evidence available or applicable for a specific patient with his or her own set of conditions, capabilities, beliefs, expectations and social circumstances. There are areas of uncertainty, ethics and aspects of care for which there is no one right answer. General practice is an art as well as a science. Quality of care also lies with the nature of the clinical relationship, with communication and with truly informed decision-making. The **BACK TO BACK** section stimulates debate, with two professionals presenting their opposing views regarding a clinical, ethical or political issue.



Murray Skeaff



Helen Petousis-Harris

BACK TO BACK this issue:

consumption and associations have returned positive, neutral and negative results. A 2011 meta-analysis on milk and dairy consumption and CVD and all-cause mortality indicated that milk intake is not associated with these outcomes and may be inversely associated with overall CVD risk. Whether or not the milk and dairy products were low fat did not appear to make a difference.³

Conclusions from the 2008 Joint FAO/WHO Expert Consultation on Fats and Fatty Acids in Human Nutrition concluded that:

- replacing SFA with polyunsaturated fats (PUFA) decreased LDL and total/HDL concentration
- replacement with carbohydrate decreased both LDL and HDL but did not change HDL/total cholesterol ratio.

or high glycaemic load are associated with an INCREASED risk of heart disease.

2. Increased consumption of alcohol, dietary beta-carotene, fibre, fish, omega-3, folate, fruit and vegetables, nut, monounsaturated fat, vitamin C, E, wholegrain and adherence to 'Mediterranean' dietary pattern are significantly associated with REDUCED risk of heart disease.
3. Factors with the most evidence for effect on heart health were Mediterranean diet (protective), vegetable consumption (protective), nut consumption (protective), trans-fatty acid consumption (detrimental) and consumption of foods of high GI or GL (detrimental).
4. There was no evidence found to support overall reduction of saturated fatty acids and concern was raised about making

In 2011, the revised Cochrane review on the matter found a small but potentially important reduction in cardiovascular risk, but not mortality, by replacing SFA with some plant oils but not reduction of total fat. Replacing SFA with carbohydrate was not beneficial.

Perhaps more importantly, the report also concluded that replacing SFA with PUFA decreases the risk of CHD; however, replacement with carbohydrate probably increases CHD and contributes to metabolic syndrome development. It found insufficient evidence relating to SFA and CHD when monounsaturated fat (MUFA) or largely whole grain carbohydrates are the replacement and insufficient evidence that SFA affects the indices related to the metabolic syndrome.⁴

In 2009 a systematic review of the evidence supporting a causal link between dietary factors and CHD, published in the *Archives of Internal Medicine*, summarised the current knowledge of dietary factors and their relationship with CHD in the four points below.⁵

1. A higher intake of trans-fatty acids and a higher intake of foods of high glycaemic index

recommendations without the benefit of RCTs. There was also concern that limiting dietary fat may result in increased consumption of carbohydrates that may lead to increased incidence of CHD.⁵

Another 2009 review of the evidence for the contribution of dietary fatty acids to CHD concluded that, "Intake of SFA was not significantly associated with CHD mortality" and "not significantly associated with CHD events".⁶ Consistent with this conclusion was a pooled analysis of cohort studies in the same year which supported benefits of PUFA but not MUFA or carbohydrate in replacing SFA.⁷

The 2009 findings were also echoed by a 2010 Harvard review of the effects of SFA consumption on CVD risk which concluded that "Public health emphasis on reducing SFA

consumption without considering the replacement nutrient or, more importantly, the many other food-based risk factors for cardiometabolic disease is unlikely to produce substantial intended benefits".⁸

A 2010 meta-analysis of prospective cohort studies found no further significant evidence for concluding that SFA are associated with an increased risk of CVD⁹ and a meta-analysis of RCTs reiterated the value of PUFA but also concluded that, given the modest plausible benefit, policies should focus substantially on other risk factors such as low seafood, fruit and vegetable consumption.¹⁰

In 2011, the revised Cochrane review on the matter found a small but potentially important reduction in cardiovascular risk, but not mortality, by replacing SFA with some plant oils but not reduction of total fat. Replacing SFA with carbohydrate was not beneficial.¹¹

What is now clear is if SFA are replaced by something, it very much depends what that replacement is. Replacing them with PUFA appears to confer health benefits, while replacing them with MUFA is uncertain and carbohydrate appears neutral or even detrimental.^{2,8,11}

For the past 60 years, public health obsessions with dietary fat have resulted in fat being generally and indiscriminately viewed as 'bad'. Low fat is seen as low calorie and therefore healthy, and there is little regard for the very real adverse effects of replacing fats, particularly saturated fats, with refined carbohydrate. Amongst this, SFA appear somewhat victimised. A booming private market in processed 'low fat', high carbohydrate foods and spiralling obesity prevalence may be some of the legacy of such messages.

The very recent comparative meta-analysis by Mente⁵ highlights that the statistical evidence supports modifying your carbohydrate intake, by means of a Mediterranean or a low glycaemic-index diet (vegetables, legumes, fruit, nuts, cheese, fish and olive oil), is more likely to help you avoid a visit to coronary care than focusing merely on reducing your saturated fat intake.

References

1. Mensink R, Zock P, Kester A, Katan M. Effects of dietary fatty acids and carbohydrates on the ratio of serum total to HDL cholesterol and on serum lipids and apolipoproteins: a meta-analysis of 60 controlled trials. *Am J Clin Nutr.* 2003;77(5):1146–55.
2. Siri-Tarino PW, Sun Q, Hu FB, Krauss RM. Saturated fat, carbohydrate, and cardiovascular disease. *Am J Clin Nutr.* 2010;91(3):502–09.
3. Soedamah-Muthu SS, Ding EL, Al-Delaimy WK, Hu FB, Engberink MF, Willett WC, et al. Milk and dairy consumption and incidence of cardiovascular diseases and all-cause mortality: dose-response meta-analysis of prospective cohort studies. *Am J Clin Nutr.* 2011;93(1):158–71.
4. Food and Agriculture Organization of the United Nations. Fats and fatty acids in human nutrition. Report of an expert consultation. Geneva; 2008. Rome; 2010.
5. Mente A, de Koning L, Shannon HS, Anand SS. A systematic review of the evidence supporting a causal link between dietary factors and coronary heart disease. *Arch Intern Med.* 2009;169(7):659–69.
6. Skeaff CM, Miller J. Dietary fat and coronary heart disease: summary of evidence from prospective cohort and randomised controlled trials. *Ann Nutr Metabol.* 2009;55(1–3):173–201.
7. Jakobsen MU, O'Reilly EJ, Heitmann BL, Pereira MA, Bälter K, Fraser GE, et al. Major types of dietary fat and risk of coronary heart disease: a pooled analysis of 11 cohort studies. *Am J Clin Nutr.* 2009;89(5):1425–32.
8. Micha R, Mozaffarian D. Saturated fat and cardiometabolic risk factors, coronary heart disease, stroke, and diabetes: a fresh look at the evidence. *Lipids.* 2010;45(10):893–905.
9. Siri-Tarino PW, Sun Q, Hu FB, Krauss RM. Meta-analysis of prospective cohort studies evaluating the association of saturated fat with cardiovascular disease. *Am J Clin Nutr.* 2010;ajcn.2009.27725.
10. Mozaffarian D, Micha R, Wallace S. Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized controlled trials. *PLoS Med.* 2010;7(3):e1000252.
11. Hooper L, Summerbell CD, Thompson R, Sills D, Roberts FG, Moore H, et al. Reduced or modified dietary fat for preventing cardiovascular disease. *Cochrane Database Syst Reviews* 2011(7).

Saturated fat has been unfairly demonised

NO

Professor C Murray

Skeaff BSc(Hons), PhD
Department of Human Nutrition, University of Otago, Department of Human Nutrition, University of Otago, PO Box 56, Dunedin, 9054, New Zealand
murray.skeaff@otago.ac.nz

Professor Rod Jackson
MBChB, PhD, FNZCPHM
School of Population Health, The University of Auckland, Auckland, New Zealand

While there may be room for legitimate debate about the proportion of coronary heart disease (CHD) that can be attributed to high saturated fat diets, it is time for the sceptics (and vested interests) to abandon denial, stop cherry-picking negative studies and accept the evidence! A causal relationship between saturated fat consumption and CHD is now scientifically convincing in range, quality and consistency.

It has long been universally accepted that increased saturated fat consumption leads to increased total, low-density lipoprotein (LDL), and total/high-density lipoprotein (HDL) cholesterol and that increased total, LDL, and total/HDL cholesterol leads to increased CHD, but sceptics have considered this to be indirect and insufficient evidence that saturated fat and CHD are causally linked. However, the more direct line of evidence, based on randomised controlled trials and cohort studies, demonstrating associations between low-saturated-fat diets and reduced CHD incidence, is now convincing.

It is important to understand that the effect of saturated fat on CHD cannot be examined in isolation from other components of the diet, because when saturated fat is removed from the diet it must be replaced with another macronutrient such as protein, carbohydrate, or other types of fat. Thus, the best science shows the effects of replacing saturated fat with some other component of the diet. In this regard, there is unanimous agreement by expert groups,¹ even the sceptical ones,² that replacing saturated fat with polyunsaturated fat reduces the risk of CHD.

The effect of saturated fat on blood lipids is unequivocal and must surely rank as one of the most extensively researched and well substanti-

ated effects of diet on a risk factor for chronic disease. The results of a meta-analysis of 90 randomised controlled trials of dietary fat modification showed that replacing 5% of energy from saturated fat (about 12 g/d, the amount in 25 g of butter or 45 g of cheese) with polyunsaturated fat reduced LDL cholesterol concentration by 0.26 mmol/L and total/HDL cholesterol by 0.18; the reduction with monounsaturated fat being slightly less, 0.21 mmol/L for LDL cholesterol and 0.15 for the total/HDL ratio.³

There is similarly overwhelming evidence that blood cholesterol is a major cause of CHD. The Prospective Cohort Collaboration,⁴ a meta-analysis of individual participant data from 61 prospective studies with 55 000 vascular deaths, showed that a 1 mmol/L lower total cholesterol was associated with a halving of CHD risk in both sexes at ages 40–49 years, a 33% reduction at ages 50–69, and a 17% reduction at ages 70–89 years. Moreover, multiple meta-analyses of randomised controlled trials show that reducing blood cholesterol with drugs decreases CHD risk in a dose-dependent manner; 19% reduction in coronary mortality per 1 mmol/L reduction in LDL cholesterol.⁵

In contrast, until recently there was some uncertainty about the evidence directly linking saturated fat intake with risk of CHD. The necessary studies are notoriously difficult to do well; a problem not well understood by the sceptics who have misinterpreted negative studies as evidence of no effect. Cohort studies are plagued by measurement error (of dietary intake) and confounding, while randomised trials of sufficient size and duration are extremely expensive to undertake, and maintaining participants on allocated diets is almost impossible. However, several recent

Skeaff CM, Jackson R. Saturated fat has been unfairly demonised —the ‘no’ case. *J Prim Health Care*. 2011;3(4):320–321.

publications have brought clarity of understanding to the debate.

In an ambitious, well-designed and landmark project, Jakobsen et al. conducted a meta-analysis after obtaining individual participant data from 11 cohort studies.⁶ All studies used validated dietary assessment methods, follow-up ranged from four to 10 years, and included 2155 CHD deaths among 344 696 participants. The results showed, after adjustment for potential confounders, that the risk of CHD death decreased by 26% (95% CI, 11–39%) per 5% lower energy intake from saturated fat and concomitant increase in polyunsaturated fat.

With regard to randomised trials, the best evidence has often been overlooked or examined piecemeal, possibly because most of the trials were published 20 to 40 years ago. Two meta-analyses of randomised controlled trials where the primary intervention was replacement of saturated fat with polyunsaturated fat have been published in the last two years and provide compelling evidence. Skeaff and Miller found that high P/S (polyunsaturated to saturated fat ratio) diets reduced the risk of coronary events by 17% (95% CI, 0–39%, $p=0.05$) compared with lower P/S diets.⁷ Mozaffarian et al. found that high P/S diets reduced risk of myocardial infarction or coronary heart disease death by 19% (95% CI, 5–30%, $p=0.008$).⁸

In conclusion, the evidence indicates that it is quite fair to demonise saturated fat. Fortunately many New Zealanders have been acting on this evidence for years, as reflected in their falling blood cholesterol levels, that began well before the introduction of statins.⁹ Nonetheless, results from the last National Nutrition Survey (1997) showed that New Zealanders consumed, on average, 15% of their energy as saturated fat.¹⁰ Current Australasian nutrition guidelines recommend that, for individuals, saturated fat should not exceed 10% of energy intake; thus, the population mean should be considerably less than 10%. The 2008–09 National Nutrition Survey will report later this year and it is unlikely we will have achieved this. Decreasing saturated fat intake to 5–10% of total energy is warranted and easily achievable for a large proportion of New

Zealand adults by reducing consumption of high fat dairy products, fatty meats, cakes, biscuits, and confectionery products and replacing this with nuts, seeds, plant oils (e.g. soybean, canola, sunflower, or safflower), and doing the margarine table spread for butter swap. Indeed, as the world's largest consumers of butter, estimated to account for almost 20% of our total saturated fat consumption, New Zealanders could improve their cardiovascular health with the stroke of a (butter) knife.

References

- Food and Agriculture Organization of the United Nations. Fat and fatty acids in human nutrition: Report of an expert consultation. FAO Food and Nutrition Paper 91. Rome: 2010, 180 p.
- Astrup A, Dyerberg J, Elwood P, et al. The role of reducing intakes of saturated fat in the prevention of cardiovascular disease: where does the evidence stand in 2010? *Am J Clin Nutr.* 2011;93:684–8.
- Mozaffarian D, Clarke R. Quantitative effects on cardiovascular risk factors and coronary heart disease risk of replacing partially hydrogenated vegetable oils with other fats and oils. *Eur J Clin Nutr.* 2009;63 Suppl 2:S22–33.
- Prospective Studies Collaboration. Blood cholesterol and vascular mortality by age, sex, and blood pressure: a meta-analysis of individual data from 61 prospective studies with 55,000 vascular deaths. *Lancet.* 2007;370:1829–39.
- Baigent C, Keech A, Kearney PM, et al. Efficacy and safety of cholesterol-lowering treatment: prospective meta-analysis of data from 90,056 participants in 14 randomised trials of statins. *Lancet.* 2005;366:1267–78.
- Jakobsen MU, O'Reilly EJ, Heitmann BL, et al. Major types of dietary fat and risk of coronary heart disease: a pooled analysis of 11 cohort studies. *Am J Clin Nutr.* 2009;89:1425–32.
- Skeaff CM, Miller JC. Dietary fat and coronary heart disease: summary of evidence from prospective cohort and randomised controlled trials. *Ann Nutr Metab.* 2009;55:173–201.
- Mozaffarian D, Micha R, Wallace S. Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized controlled trials. *PLoS Med.* 2010;7 (3):e1000252.
- Tobias M, Taylor R, Yeh L-C, Huang K, Mann S, Sharpe N. Did it fall or was it pushed? The contribution of trends in established risk factors to the decline in premature coronary heart disease mortality in New Zealand. *Aust NZ J Pub Health.* 2008;32:117–25.
- Skeaff CM, Mann JI, McKenzie J, Wilson NC, Russell DG. Declining levels of total serum cholesterol in adult New Zealanders. *NZ Med J.* 2001;114:131–4.

Aloe vera

Aloe vera, Aloe barbadensis, Aloe capensis

Felicity Goodyear-Smith MBChB, MGP, FRNZCCP; Professor, Department of General Practice and Primary Health Care, School of Population Health, The University of Auckland, Auckland, New Zealand

PREPARATION: Aloe vera is a succulent perennial plant that belongs to the lily family. It has been used topically for thousands of years. The product used is a gel—a clear, jelly-like substance that's scraped from the inner region of the leaf. Its main uses are as an emollient, but it may also be taken internally.

ACTIVE CONSTITUENTS: Aloe vera leaves contain a range of biologically active compounds, including acetylatedmannans, polymannans, anthraquinone, C-glycosides, anthrones and anthraquinones and various lectins.

USES: Externally for skin conditions such as psoriasis, eczema, shingles, genital herpes, cuts, burns, and internally for digestive problems including ulcers and diverticulitis.

EVIDENCE FOR EFFECTIVENESS: There is some evidence that aloe vera cream performs better than placebo for chronic plaque psoriasis¹ and that pressure ulcers have improved healing where wounds are cleansed with saline spray containing aloe vera.² There is insufficient evidence that its use in dressings and topical agents improves healing of surgical wounds,³ or that disposable napkin linings impregnated with aloe vera extract prevents napkin dermatitis in infants.⁴

There is very weak evidence that aloe vera may be associated with a reduction in pain in oral lichen planus⁵ and with

Summary Message

Topical aloe vera may be effective in treating skin diseases such as psoriasis with little adverse effect apart from occasional rash. While there is weak evidence supporting its oral use in specific conditions, it may exacerbate a number of chronic conditions and has the potential for a number of drug interactions; hence its oral use is not recommended. As with any plant extract, caution is needed to ensure that a standardised pharmacological dose is being administered.

prevention of oral mucositis in patients receiving treatment for cancer.⁶

ADVERSE EFFECTS: Most likely safe if used topically. Minor redness and rash have been reported with topical use. Topical use of aloe is probably safe for children, pregnant and nursing women. Internal use of aloe may cause acute hepatitis, increase liver enzymes and alter potassium and blood glucose lab test results. US Food and Drug Administration warns against the use of aloe as a laxative. Internal use of aloe may interfere with nutrient absorption and particular caution is needed in patients who have diabetic, cardiac, renal, or gastrointestinal conditions. Oral use of aloe may cause electrolyte imbalance. Not recommended for prolonged use or for injection. Deaths have occurred after aloe was injected in humans, but oral use also is not recommended.

DRUG INTERACTIONS: Avoid topical use of aloe if using topical steroid medications. Do not use with azidothymidine (AZT) antiretroviral drug used

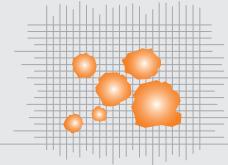
for treatment of HIV/AIDS. Internal use may interfere with loop diuretics, such as furosemide. Do not use with other laxatives, cardiac medications, oral corticosteroids, or hypoglycemic drugs. In New Zealand, CARM has received a report involving warfarin interactions with aloe vera (Prescriber Update Articles Watching Briefs—November 2007 Medsafe).

Key references

1. Mason AR, Mason J, Cork M, Dooley G, Edwards G. Topical treatments for chronic plaque psoriasis. Cochrane Database of Systematic Reviews. 2009(1).
2. Moore EH, Cowman S. Wound cleansing for pressure ulcers. Cochrane Database of Systematic Reviews. 2011(4).
3. Vermeulen H, Ubbink DT, Goossens A, de Vos R, Legemate DA, Westerbos JS. Dressings and topical agents for surgical wounds healing by secondary intention. Cochrane Database of Systematic Reviews. 2010(10).
4. Baer EL, Davies MW, Easterbrook K. Disposable nappies for preventing napkin dermatitis in infants. Cochrane Database of Systematic Reviews. 2009(1).
5. Thongprasom K, Carrozzo M, Furness S, Lodi G. Interventions for treating oral lichen planus. Cochrane Database of Systematic Reviews. 2011(7).
6. Worthington HV, Clarkson JE, Bryan G, et al. Interventions for preventing oral mucositis for patients with cancer receiving treatment. Cochrane Database of Systematic Reviews. 2011(4).

Herbal medicines are a popular health care choice, but few have been tested to contemporary standards. **POTION OR POISON?** summarises the evidence for the potential benefits and possible harms of well-known herbal medicines.

Allopurinol—dose according to effect, not renal function



Dr Linda Bryant MClinPharm, PGDipHospPharmAdmin, PhD, FNZHPA, FNZCP, FPSNZ, MCAPA

Gout is not a benign or minor condition. Hyperuricaemia with gout results in:

- reduced exercise and activity levels
- lost productivity
- hospital admissions
- joint damage
- renal damage

...and is associated with cardiovascular disease—particularly raised blood pressure.

It is a chronic disease and we may have been doing a disservice to many people by under-treating it because of strict adherence to some 'dosing in renal impairment' guidelines.

Previous concerns were that oxypurinol, a renally excreted metabolite of allopurinol, accumulated in renal impairment and was associated with allopurinol hypersensitivity syndrome. More recent information indicates that allopurinol hypersensitivity reactions are not necessarily dose dependent and do not always correlate to serum oxypurinol concentrations.^{1,2}

STARTING ALLOPURINOL: Start allopurinol as soon as can be negotiated with the patient after the first episode. This is particularly important for Maori and Pacific people in whom there is a strong genetic basis for gout, and gout will be frequent and lifelong. The traditional 'wait for two episodes per year' no longer holds true. Each episode of gout damages the joints—and the kidneys.

Initial dose: To help avoid confusion for the patient with multiple dosage changes, start allopurinol at 150 mg [1/2 x 300 mg] daily and double the dose to 300 mg after four weeks. Titrate according to serum uric acid concentrations.

Prophylactic cover: Use colchicine, usually 0.5 mg daily, for three to six months. Remember to stop the colchicine after this time.

ADVERSE EFFECTS: General skin reactions may occur in 4–10% of people. Allopurinol must be discontinued at the appearance of a skin rash or other signs (fever, arthralgia, lymphadenopathy) which could indicate an allergic reaction (hypersensitivity syndrome).

MINI-NUGGETS:

- Gout affects 10–14% of Maori and Pacific people compared to 3–5% of Europeans.
- Men in their 20s and 30s are getting gout resulting in lost time at work and stopping sports and other activities.
- Exercise may precipitate gout, so don't assume that sudden severe joint pain is a 'sports injury' in high-risk populations. It may be gout.
- Some people may be more inclined to take allopurinol earlier, and regularly, if they realise that it could allow them to eat small amounts of gout-inducing food, e.g. shellfish.
- Fructose containing soft drinks and fruit juices may precipitate gout.
- When serologic human leukocyte antigen (HLA) typing becomes more readily available (near future) you may be able to test for HLA-B*5801, which is a strong marker for allopurinol-induced severe cutaneous adverse reactions.⁵

References

1. Chao J, Terkeltaub R. A critical appraisal of allopurinol dosing, safety, and efficacy for hyperuricaemia in gout. *Curr Rheumatol Report*. 2009;11:135–40.
2. Dalbeth N, Stamp L. Allopurinol dosing in renal impairment: walking the tightrope between adequate urate lowering and adverse events. *Semin Dial*. 2007;20:391–5.
3. Stamp I, O'Donnell J, Zhang M et al. Using allopurinol above the dose based on creatinine clearance is effective and safe in chronic gout, including those with renal impairment. *Arthritis Rheum*. 2010; Oct 27th [published ahead of print].
4. Vazquez-Mellado J, Morales E, Pacheco-Tena C, Burgos-Vargas R. Relation between adverse events associated with allopurinol and renal function in patients with gout. *Ann Rheum Dis*. 2001;60:981–3.
5. Jung J, Song W, Kim Y et al. HLA-B58 can help the clinical decision on allopurinol in patients with chronic renal insufficiency. *Nephrol Dial Transplant*. 2011; March 10th [Epub ahead of print].

KEY POINTS

- Treat to target serum uric acid concentrations (< 0.36 mmol/L) rather than according to renal function. This has been shown to be safe and effective.^{3,4}
- Doses of allopurinol may need to be titrated up to 600 mg.

CORRESPONDENCE TO:

Linda Bryant

Clinical Manager, Clinical Advisory Pharmacist,
East Health Trust PHO
PO Box 38248, Howick
Auckland, New Zealand
l.bryant@auckland.ac.nz

NUGGETS of KNOWLEDGE provides succinct summaries of pharmaceutical evidence about treatment of common conditions presenting in primary care and possible adverse drug reactions.

String of PEARLS

Practical Evidence About Real Life Situations

Myocardial infarction

PEARLS are succinct summaries of Cochrane Systematic Reviews for primary care practitioners—developed by Prof. Brian McAvoy for the Cochrane Primary Care Field (www.cochraneprimarycare.org), New Zealand Branch of the Australasian Cochrane Centre at the Department of General Practice and Primary Health Care, University of Auckland (www.auckland.ac.nz/uoa), funded by the New Zealand Guidelines Group (www.nzgg.org.nz) and published in NZ Doctor (www.nzdoctor.co.nz).

- Limited evidence for benefits of health promotion interventions for coronary heart disease
- Multiple risk factor interventions for primary prevention of coronary heart disease have limited utility
- No evidence for benefit of oxygen in acute myocardial infarction
- Music interventions may be beneficial for coronary heart disease
- Some evidence that interventions can increase uptake and adherence in cardiac rehabilitation
- Heparins reduce the number of heart attacks after acute coronary syndromes

DISCLAIMER: PEARLS are for educational use only and are not meant to guide clinical activity, nor are they a clinical guideline.



Pronation may be more effective than supination in correcting subluxed radial head

Bruce Arroll MBChB, PhD, FRNZCGP; Professor of General Practice and Primary Health Care, The University of Auckland, PB 92019, Auckland, New Zealand; Email: b.arroll@auckland.ac.nz

THE PROBLEM: A subluxation of the radial head is a problem that is seen not uncommonly in primary care. There is usually a history of an adult pulling the child and then sudden onset of pain and reluctance to move the arm. Given the lack of major trauma there is no need to x-ray the joint (assuming you are happy with the history) and the x-rays may be unhelpful. There are two ways of reducing the subluxation: In the typical manoeuvre, called supination, the forearm is twisted or rotated outwards (palm of child's hand faces upwards), sometimes followed by bending of the elbow. While this has become standard practice, it is not always successful. Other methods, particularly the use of pronation, where the forearm is twisted or rotated inwards (palm of child's hand faces downwards) have also been used. The manoeuvre is sometimes associated with click and the child is immediately happy to move the arm and the parent(s) is greatly relieved and often impressed at the simplicity of the procedure.

CLINICAL BOTTOM LINE: The Cochrane review found that there is limited evidence from three small low-quality trials that the pronation method might be more effective and less painful than the supination method for manipulating radial head subluxation in young children. However, only a small difference in effectiveness was found.

Pronation may be more effective than supination for radial head subluxation

	Success	Evidence	Harms
Pronation vs supination	Small advantage for pronation in that less likely to fail	3 small, low quality RCTs ¹ Cochrane review ¹	Less pain with pronation. There may be some bruising associated with the condition rather than the treatment

Reference

1. Krul M, van der Wouden JC, van Suijlekom-Smit LWA, Koes BW. Manipulative interventions for reducing pulled elbow in young children. Cochrane Database of Systematic Reviews 2009, Issue 4. Art. No.: CD007759. DOI: 10.1002/14651858.CD007759.pub2.

All people residing in New Zealand have access to the Cochrane Library via the Ministry website www.moh.govt.nz/cochranelibrary

e Runanga o Te Rarawa Rheumatic Fever Reduction Programme—Kaitaia

Lance O'Sullivan MBChB, FRNZCGP

Rheumatic fever in Kaitaia

Acute rheumatic fever (ARF) and rheumatic heart disease (RHD) are the consequence of untreated Group A Beta haemolytic streptococcus (GABHS) pharyngitis with up to three in 100 children with untreated strep throat developing ARF in high risk areas. Between 10% and 15% of sore throats presenting to doctors are due to GABHS. This does not take into account the number of sore throats that do not make it to doctors due to access issues, lack of understanding or poor communication of the risk of sore throats among children.

Mortality from RHD is the most inequitable of all illnesses Maori face, with almost 7.5 times the chance of early death from chronic RHD than non-Maori. This is greater than the mortality inequities seen in other big ticket diseases such as diabetes, ischaemic heart disease or cancer. In NZ, most cases of ARF occur among Maori and Pacific Island children, with 95% of cases of

ARF in children aged 5–15 years. In terms of incidence rates (new cases), ARF shows the greatest health inequity of all in Te Tai Tokerau. Ninety-eight percent of those affected in our Northland District Health Board are tamariki Maori. In Kaitaia, 29/30 children with ARF are Maori. Tamariki Maori in Northland have about a one in 200 chance of a damaged heart by the end of school. This is preventable. Over the period of 2006–2010 Kaitaia is one of several areas in Te Tai Tokerau with high

rates in Maori (and Pacific) children have increased since 1993 by 50%, but declined for Pakeha children to negligible levels. Increasing socioeconomic disparities and population growth are likely to be a major contributor to this gap increasing, unless there is an effective strategy to address this.

Once diagnosed with rheumatic fever, around 130 tamariki in Northland each year receive a very painful injection every month for at least 10 years to pre-

Nationally, rheumatic fever rates in Maori (and Pacific) children have increased since 1993 by 50%, but declined for Pakeha children to negligible levels.

rates (75–100/100,000), the others being Kaikohe and Hokianga.

Despite having high rates of ARF/RHD, Kaitaia has not had a dedicated ARF prevention/reduction programme. The rates of ARF and RHD can be considered as highly sensitive indicators of Maori to non-Maori child health inequities in Te Tai Tokerau. Nationally, rheumatic fever

vent more heart damage. The life span of tamariki affected is reduced, and cardiac surgery may be necessary. Strokes, heart failure and heart arrhythmias are other serious sequelae of RHD throughout adult life. Most of the health sector costs of ARF/RHD occur after the age of 30 as cardiac function deteriorates and heart valves require investigation, medication and surgical repair or replacement.¹

CORRESPONDENCE TO:
Lance O'Sullivan
maori1@xtra.co.nz



Pounamu

MAORI PRIMARY HEALTH CARE TREASURES
Pounamu (greenstone) is the most precious of stone to Maori.

'Ahakoa he iti, he pounamu'
(Although it is small, it is valuable)

There is a massive burden on Maori whanau in Te Tai Tokerau living with RHD. Families of children with RHD live with the emotional and psychological cost of this disease. As these children grow with RHD their lives are needlessly shaped by the limitations that RHD has the potential to place on them. Childbearing among females with RHD places a severe strain on their hearts, and fathers with RHD can suffer the ignominy of being beneficiaries rather than providers.

School-based throat-swabbing programmes have been shown to be effective in reducing ARF by over 50%.¹ They improve both equity of access to treatment

0.4/100 000. Our purpose is to contribute to eliminating health inequities for Maori in Te Tai Tokerau, specifically in the prevention of RHD by way of delivering a comprehensive school-based throat-swabbing programme (SBTSP). The overall objective is to reduce the incidence of ARF in the Kaitaia district as a result of increased public awareness of sore throats coupled with appropriate sore throat management at the primary health care level. This project is part of a strategic plan for eliminating ARF in Te Tai Tokerau by 2020, as our contribution to the national goal. There are three major approaches to reducing the morbidity and mortality associated with ARF and RHD:

Families of children with RHD live with the emotional and psychological cost of this disease. As these children grow with RHD their lives are needlessly shaped by the limitations that RHD has the potential to place on them.

and outcome. Recent cost-effectiveness analysis has shown they are cost-effective in areas with high rates of ARF (based on primary and decile 1 and 2 intermediate schools at an ARF incidence of 75 per 100 000, school sore throat clinics can be expected to cost about \$60 000 per quality-adjusted life year (QALY) gained or \$190 000 per ARF case averted). This is similar to that for a universal meningococcal vaccination programme during an epidemic (\$68 000 per QALY).²

Korokoro Ora Manawa Ora (MOKO)

The vision for our project is a rheumatic fever-free Te Tai Tokerau in 2020. Free of rheumatic fever means a rate less than

Korokoro Ora Manawa Ora (MOKO) focuses on the second area, in particular in the school setting, but also has linkages to other service providers such as the housing sector, Ministry of Social Development, Maori health providers, Iwi providers, social services and primary health care providers. It builds on the Whangaroa/Kaeo school project, the learning from the existing Kaikohe school project and current research and projects being carried out in other DHBs. An SBTSP has been shown to reduce ARF by over 50%.

Our proposed action for the whanau of Te Rangianiwaniwa is implementation of the programme that was successfully run in Kaeo. If a child complains of a sore throat, then an appropriately trained member of the kura whanau takes a throat swab. If this comes back positive then a course of antibiotics will be arranged for the child to take.

A proposal has been accepted by the Ministry of Health to fund kaimahi coming into schools three days a week to take throat swabs of children complaining of a sore throat. This is a four-year programme and hopes to prevent between five and 12 children in Kaitaia getting rheumatic fever. Children needing antibiotics will either get these from the programme team staff or from their GP, whichever is the whanau preference. The programme was launched on 12 September 2011, heading for our goal of a rheumatic fever-free Te Tai Tokerau.

References

- Lennon D, Stewart J, Farrell E, Palmer A, Mason H. School-based prevention of acute rheumatic fever: a group randomized trial in New Zealand. *Pediatr Infect Dis J*. 2009;28(9):787–94.
- Milne R, Vander Hoorn, S. Burden and cost of hospital admissions for vaccine-preventable paediatric pneumococcal disease and non-typable *Haemophilus influenzae* otitis media in New Zealand. 2010. *App Health Econ Health Policy*. 2010;8(5):281–300..

Alliance Health+ Trust

Ti'a Kirkpatrick Mariner, Programme Manager, Pacific Health Division, Mental Health and Addictions, Counties Manukau District Health Board

In 2010, Alliance Health+ (AH+) was established in response to the Ministry of Health policy Better, Sooner, More Convenient (BSMC) Health Care in the Community and resulted in the consolidation of three Pacific-led Primary Health Organisations (PHOs): Ta Pasi-fika (Bader Drive and Southseas), Auckpac, and Tongan Health Society. In addition, AH+ was selected to participate in another Government initiative called Whanau Ora which provided an exciting opportunity to enhance primary care and include other Pacific NGO providers such as Healthstar Pacific and Penina Trust to strengthen the 'holistic model of care' approach.

Whilst BSMC is essentially aimed at the delivery of primary health care services by investing more resourcing in frontline services (i.e. vertical integration), Whanau Ora provides a platform to enhance primary care by formalising robust strategic and operational relationships intersectorally (i.e. horizontal integration).

"Whanau Ora is about empowering whanau to take control of their future. What we want for our whanau is to be self-determining, to be living healthy lifestyles, to be participating fully in society and to be economically secure." (Hon. Tariana Turia)

The collective developed O Le Aiga ma le Fanau ia Ola Pacific philosophy for Whanau Ora which describes health and wellbeing in the context of relationships, social environments, and the wider determinants of health. It takes a long-term perspective of building for future generations.

AH+ also conducted community consultations and family fonos to help inform the AH+ ap-

proach to Whanau Ora Programme of Action and Business Case. These were well attended and here is some of the feedback:

"I can't even begin to think about my health needs until I get the other priorities sorted!" (Whanau)

"No one ever wins at WINZ." (Whanau)

"I want a service where people will walk with me, not just talk at me." (Whanau)

"Why do we get called high and complex needs, we should be called poorly serviced." (Whanau)



VAIKOLOA

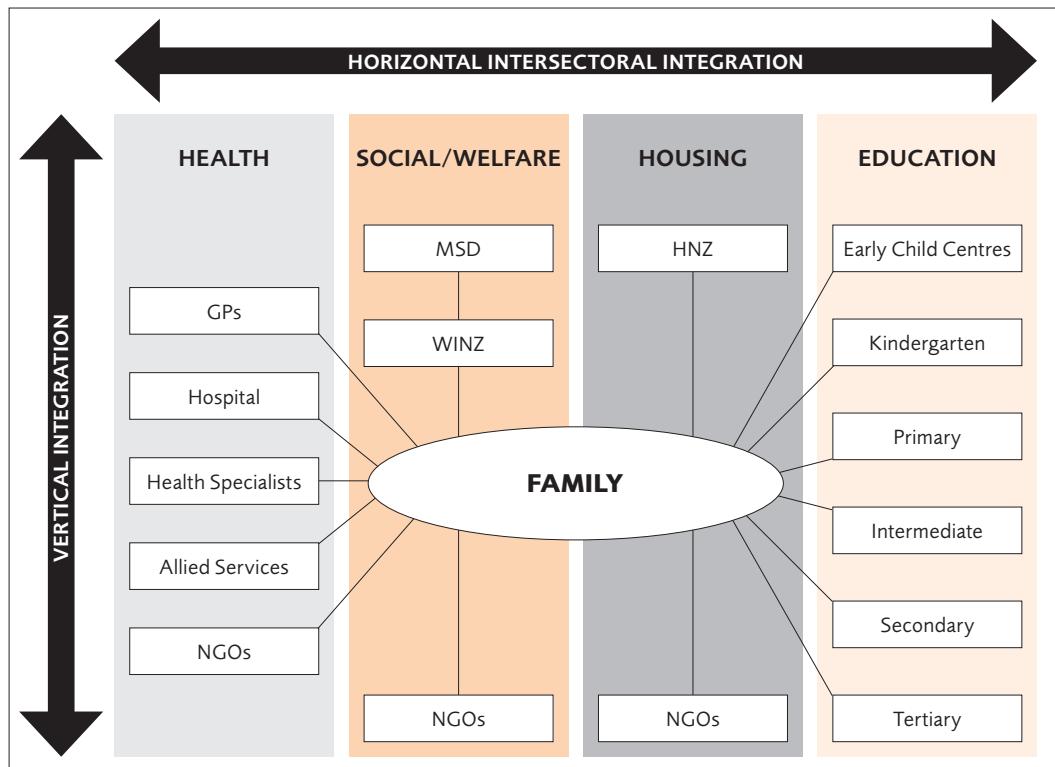
Pacific Primary Health Care Treasures

Vai (water) is a symbol of 'life-source' and koloa (treasures) to share

"My hope is that my kids do not repeat the same mistakes I made around money—I admit I made some bad decisions but my kids shouldn't have to suffer because of it." (Whanau)

"How can we constantly prescribe asthmatic medication when the families continue to live in an overcrowded, cold, damp, mouldy home that aggravates and triggers asthma attacks. If we addressed the housing problem first we can remedy and relieve the asthmatic condition." (Nurse)

"We often have to do those things outside of our contract so we can achieve the outcome." (Provider)



"I already practice in a whanau way so whanau ora isn't new to Pacific." (Provider)

"Our contracts are so restrictive and consequences appear punitive, we feel guilty when we venture outside the scope of our contracts but if we didn't we wouldn't get the outcomes." (Provider)

The feedback strongly aligned with the AH+ philosophy and model of care to provide holistic services to patients and families through the engagement of wider health and social services.

Whilst BSMC is essentially aimed at the delivery of primary health care services by investing more resourcing in frontline services (i.e. vertical

integration), Whanau Ora provides a platform to enhance primary care by formalising robust strategic and operational relationships intersectorally (i.e. horizontal integration).

The common themes from these consultations and fono recommended the need for a coordinated effort of both BSMC and Whanau Ora approaches to help improve outcomes for families and communities.

AH+ would like to take this opportunity to acknowledge the Ministry of Health and Te Puni Kokiri for their support and the courage to allow AH+ the flexibility to explore how both strategies could be reconciled for the betterment of families and the communities they serve.

CORRESPONDENCE TO:

Ti'a Kirkpatrick Mariner
Alliance Health+ and
Counties Manukau
District Health Board
kirk.mariner@
middlemore.co.nz

A tale of two deaths

Stephen Main MB BChir, PhD, FRNZCGP

This is the story of two elderly women who died. One was lucky. One was unlucky. One was my mother. One was my wife's mother. But the only relevance of that for the story is that the details of their respective final illnesses are fully known to me.

Audrey had been a schoolteacher. She lived in London all her life which included two world wars, and saw amazing advances in technology, science and medicine. She enjoyed the technology because she was able to drive and keep herself busy for the 33 years of widowhood following her husband's sudden death in his prime. She never really got over that catastrophe, but she kept busy and got on with life well enough for most of the time. She was the lucky one when it came time for her to leave the world.

She had always had good health, been a bit of a worrier with minor complaints after her husband died, but nothing serious. Eventually, however, it became apparent that she was becoming increasingly forgetful, she began to rather neglect her appearance and general cleanliness, and she started getting through kettles at an alarming rate, whistles notwithstanding, through forgetting she had put them on the gas stove. Shortly before her 89th birthday, a urinary infection rendered her unable to cope at all and she was admitted 'temporarily' to a nursing facil-

ity near where she lived. She had 'lost the place' entirely by now, but settled happily enough into an affable state of dementia, well cared for in her nursing home. On admission, a thorough medical uncovered a nasty feeling breast lump. This was almost certainly a breast cancer but the diagnosis remained 'almost certain' as she was otherwise asymptomatic and, after discussions between doctor and family, no one could see the point in subjecting her to painful investigation and treatment which she was no longer capable of understanding. She was a little unsteady now and one day fell and hurt a rib. She may have fractured it—it might, I suppose, have been a pathological fracture given the clinical diagnosis of breast cancer, but investigation was not taken up and her pain was well enough controlled with oral analgesics.

Things were not looking good for the longer term and it was readily apparent that she was nearing the end of her life—not that she seemed bothered by that herself. One day there was a call from the nursing home to say that she had become more unwell, had become more than usually confused, and had a slight fever. Her doctor had seen her and she was comfortable, but the nurses felt that "family might wish to visit as, with her degree of frailty it was possible that any infection might prove fatal". Her son visited again and found that she no longer

knew him, was rambling in her speech, mildly febrile, possibly a little dehydrated and with a rather rapid pulse. She was in no apparent distress, but obviously ill. She had refused food and medication for 24 hours or more and was taking only sips of fluid. She died peacefully that night. Her infection, site unknown, had not been treated with antibiotics, her dehydration had not been treated with parenteral fluids, and restlessness—possibly due to pain—had been controlled with small doses of morphine mixture. Her nursing care had been exemplary. The death certificate read "senile dementia". Her family were grateful for her care and that her illnesses had not been made worse by investigations and treatment for a breast lump that would have been distressing to her and possibly futile, given that she had already lost her mind and her independence.

It was, to use contemporary medical parlance, a 'good death'.

Joyce was in her 80th year when she died, but she had not had particularly good health. Her life was blighted by a severe postnatal depression requiring hospital admission and ECT. She had had a breast cancer in middle age successfully treated with local radiotherapy, and had been free of recurrence for many years. Her husband had angina and underwent open coronary artery

CORRESPONDENCE TO:
Stephen Main
Hokianga Health, Rawene Hospital, Hokianga, Northland, New Zealand
steve.main@hokiangahealth.org.nz

The **ETHICS** column explores issues around practising ethically in primary health care and aims to encourage thoughtfulness about ethical dilemmas that we may face.

THIS ISSUE: Northland GP Stephen Main presents two personal cases of end-of-life care which illustrate the ethical dilemmas implicit in deciding when to treat or not to treat conditions which may shorten life.

surgery but he survived into his seventies, finally succumbing to bowel cancer. She nursed him till he died, at home, with help from family and community nursing services. Within a year after his death, things were not right with her. Mentally she was coping well but she started having falls, getting difficulty with fluency of speech and lost the ability to play her piano and also to swim.

Everyone feared cerebral secondaries from her previous breast tumour, but it wasn't that. After specialist investigations the diagnosis was cerebellar degeneration, cause unknown, outlook progressively increasing disability but without significant dementia, leading to death after an indeterminate period of anything from months to a few years, depending on individual situation and comorbidities. Not a cheerful thought. She and the family discussed making an advance directive to the effect that excessive invasive treatments and resuscitation attempts were not to be made in the event of her being ill and unable to communicate her wishes. Unfortunately (in retrospect) this was never formally put in place.

As expected, she gradually lost the ability to walk unaided, her speech deteriorated and conversation became increasingly difficult. She developed a pneumonia—a common complication of progressive motor loss in neurological disease. She was admitted to hospital and her pneumonia treated. However, her recovery was prolonged because of her underlying problems. By now she was unable to care for herself and it was clear she was never likely to regain her independence. She had no real choice but to be admitted to a high dependency care home.

Her progressive neurological illness was inexorably disabling her, gradually and unstoppably, but also predictably, locking her in, cutting off communication with the world. Because she couldn't speak, friends tended to stay away—

visits were too difficult to sustain for more than a few minutes at a time on an infrequent basis. The rest of her time, for over a year, she lay paralysed in bed in her single room on the top floor of her high dependency nursing home, visited frequently but briefly by family and rather over-worked nurses, and in between times unable to move, unable to change position herself, unable to scratch an itch or move limbs to relieve pain. She suffered. She was unlucky.

Some weeks later she developed another chest infection and she remained unlucky. The on-call doctor did not know her well and decided to treat her pneumonia with antibiotics, thus dragging her back from death yet again. In

It is arguable that three cornerstones of ethical principles were violated and yet at every stage her professional carers would have felt that indeed they were doing their best for her.

the event she had another three months of staring at the ceiling, unable to speak, cry out or in any useful way enjoy quality of life. Finally a third chest infection supervened and, in consultation this time with her family, she received symptom relief only and death released her from torment.

Joyce's situation illustrates the dilemmas that often result in futile treatment. In retrospect it is a shame that her pneumonia had been treated so well in hospital. But that is what hospitals do and you cannot fault them for that—can you?

At no point did she receive anything short of good nursing care, but maybe her medical decisions could have been done better. In Audrey's situation the decisions were perhaps easier and in retrospect wiser, but who is to say what

should and should not be treated? How can you really know what a patient who cannot speak for herself actually wants?

What was the ethical test here? Was the continuing treatment of infections in Joyce's best interests? Did it do no harm? Was her autonomy respected, or even able to be respected?

It is arguable that three cornerstones of ethical principles were violated and yet at every stage her professional carers would have felt that indeed they were doing their best for her. By cruel twists of fate her illness failed to kill her before she had suffered months of living hell which could have been avoided if her physicians had had the courage not to do

so much. She had not, herself, made a formal legal advance directive about this. Poor woman—I think she was afraid to. We cringe these days from what is regarded as paternalism from doctors. But, as yet, death is not optional and often it can be kinder to allow it to occur rather than to attempt increasingly futile treatments which merely prolong suffering.

I make no judgments here. The facts are as I have told them. It is hard to say what should or should not have been done for either of these women, and opinions will differ. What will you do when you are faced with similar cases in future? What would you want for your mother? What would you want for yourself?

Morphine can be wonderful stuff—God's own medicine according to William Osler.

Tranexamic acid—a recipe for saving lives in traumatic bleeding

Ian Roberts PhD

The Cochrane Injuries Group requested that all medical editors who are members of WAME (the World Association of Medical Editors) publish this short editorial to help doctors around the world know that tranexamic acid significantly reduces death due to traumatic bleeding. While it relates to hospitalised patients, it also applies within primary care because the benefits are only gained if it is given within three to four hours of injury.

Using kitchen scales, carefully weigh out 4 kg of rice and pour it into a deep saucepan. Now put your hands into the rice and let the grains run between your fingers. Contemplate carefully each grain. The number of grains (about 140 000) is approximately the number of lives that could be saved each year worldwide if all hospitalised trauma patients with significant bleeding were treated with tranexamic acid (TXA) within three hours of injury. TXA is cheap and widely available. All that is needed to reap these human benefits is that doctors use it.

That TXA is a potent inhibitor of fibrinolysis was first reported in September 1962.¹ Since then TXA has been widely used to treat heavy menstrual bleeding and to reduce blood loss in elective surgery where it reduces blood transfusion by about one-third.² The CRASH-2 collaborators hypothesised that TXA might also reduce bleeding in trauma patients. The CRASH-2 trial was a UK government-funded randomised trial of the effects of the early administration of TXA on death, vascular occlusive events and blood transfusion in bleeding trauma patients.

A total of 20 211 adults with significant traumatic bleeding were randomised to receive TXA or matching placebo, with 99.6% follow-up. The risk of death due to bleeding was significantly reduced with TXA. If TXA is given within three hours of injury, it reduces the risk of bleeding

to death by nearly one-third (relative risk = 0.72 [95% CI 0.63–0.83], $p<0.001$). All cause mortality was also significantly reduced.^{3,4} The large numbers of patients studied in a wide range of different health care settings help these results to be generalised widely. On the basis of the results of the CRASH-2 trial, TXA has been included in the WHO list of essential medicines.⁵ Giving TXA to bleeding trauma patients within three hours of the injury could save over 100 000 lives per year worldwide. Giving TXA to bleeding trauma patients is highly cost-effective in high, middle and low income countries.⁶ It is essential that all doctors who treat trauma patients are aware of the results of the CRASH-2 trial.

TXA should be given to all adults with significant haemorrhage (SBP <90, HR >110) or those considered by the clinician to be at risk for significant haemorrhage. Because the effect of TXA on death due to bleeding depends importantly on the time interval between the injury and the onset of treatment, it should be given as early as possible and within three or four hours of the injury as it is unlikely to be effective if given later than this.

References

- Okamoto S, Okamoto U. Amino-Methyl-Cyclohexane-Carbolic Acid: AMCHA. A new potent inhibitor of fibrinolysis. Keio J Med. 1962;11:105–115.
- Henry DA, Carless PA, Moxey AJ, et al. Anti-fibrinolytic use for minimising perioperative allogeneic blood transfusion. Cochrane Database Syst Rev 2007; 4: CD001886
- The CRASH-2 Collaborators. Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomized, placebo-controlled trial. Lancet. 2010;376:23–32.
- The CRASH-2 Collaborators. The importance of early treatment with tranexamic acid in bleeding trauma patients: an exploratory analysis of the CRASH-2 randomized controlled trial. Lancet. 2011;377:1096–101.
- http://www.who.int/selection_medicines/committees/expert/18/en/index.html
- Guerriero C, Cairns J, Perel P, Shakur H, Roberts I, et al. Cost-effectiveness analysis of administering tranexamic acid to bleeding trauma patients using evidence from the CRASH-2 trial. PLoS ONE 2011; 6(5): e18987. doi:10.1371/journal.pone.0018987

Editor, Cochrane Injuries Group; Clinical Co-ordinator CRASH-2 trial, and Professor, Clinical Trials Unit, London School of Hygiene and Tropical Medicine, London, UK

CORRESPONDENCE TO:
Ian Roberts
Ian.Roberts@lshtm.ac.uk

Getting to the pharmacy: auditing primary non-adherence

We read with interest the recent *Viewpoint* article on medicines adherence.¹ Dr Bryant highlights the complexities of researching adherence, with published studies often relying on measures like prescription refills, electronic monitoring of container opening, self-reporting or changes in clinical indicators.¹ However, such measures ignore an aspect of adherence that is all too familiar to general practice, that of primary non-adherence—in other words, the prescriptions that never even get dispensed.

This issue was the focus of a local clinical audit in 2006, where all electronically generated prescriptions by one GP were linked with prescriber-based information provided by the Ministry of Health to estimate dispensed prescriptions. At the time, the part-time GP's workload was restricted to high school-aged students who attended any of three school-based clinics in rural Waikato. Overall, 40% of all prescriptions generated during one school year were not dispensed, ranging from 31% to 48% across the three school settings. The bulk of the un-filled prescriptions related to contraceptives and antibiotics, most of which are readily available on a Prescriber Supply Order in New Zealand. Direct dispensing was an effective ongoing intervention to overcome some of the adherence barriers faced by the young students.

How common is primary non-adherence in a more general setting? A recent US study reported 7.4% (1142) of patients enrolled in an integrated health care delivery system, who were newly prescribed antihypertensive, antidiabetic, or antihyperlipidaemic medication, did not have their medication dispensed.² As the study authors say, overlooking primary non-adherence distorts the true relationship between medication adherence and clinical outcomes.

Dr Jane Morgan
Hamilton Sexual Health Clinic

Dr Bronwyn Campbell
GP Medical Educator, Waikato & Bay of Plenty, RNZCGP

References

1. Bryant L. Medicines adherence—evidence for any intervention is disappointing. *J Prim Health Care*. 2011;3:240–3.
2. Raebel MA, Carroll NM, Ellis JL, Schroeder EB, Bayliss EA. Importance of including early nonadherence in estimations of medication adherence. *Ann Pharmacother*. 2011;45(9):1053–60.

The importance of locality planning in New Zealand health care

Although New Zealand (NZ) is a small country, our population is dispersed and there are significant differences between regions and across the urban/rural divide. I argue that the planning of community health care services must be locality-based.

Variability is a hallmark of the NZ primary health care (PHC) system. Across districts there is significant variability in the availability of general practitioners,¹ the characteristics of practices (especially between privately-owned, community-owned and low cost access practices),² the historical origins and current activities of Primary Health Organisations (PHOs)³ and their response to the present government's initiatives.⁴ Further, there are differences in the skills and interests of individual providers, and in the relationships between them.

Geography also has a significant impact. In small, relatively remote towns, distance is a key difficulty, but the small population is likely to be cohesive. There are particular benefits from out-reach clinics, dispersed testing facilities and the local provision of beds to which sick or injured people can be admitted for observation. Providers of different types can work together informally and there are opportunities for community development.

In contrast, in large cities distances are short and public transportation is available. However, community relationships may be weaker and health care providers may be unknown to each other. Under these circumstances, coordination of services is important and it is useful to ensure that different types of services are available to meet the needs of different groups.

Localities should be big enough to be independently viable but not so big as to have widely differing needs. In some cases smaller populations need specific attention. For example, on Auckland's North Shore, it would be desirable to distinguish Kaipatiki (a local board of Auckland City) which includes the more deprived neighbourhoods, rather than North Shore (a ward of the City) which also includes the well-off neighbourhoods of Takapuna and Devonport.

Locality planning has been embraced by Waitemata and Counties Manukau District Health Boards (DHBs) but it is, as yet, unclear how it will manifest. Each locality requires a unit, having oversight of all health services, able to undertake needs analysis and responsible for meeting these needs with the resources available. If such units are established, their

Letters may respond to published papers, briefly report original research or case reports, or raise matters of interest relevant to primary health care. The best letters are succinct and stimulating. Letters of no more than 400 words may be emailed to: editor@rnzcgp.org.nz. All letters are subject to editing and may be shortened.

responsibilities should be clearly defined to reduce the wasteful conflict that often exists between organisations at present.³ They could be the loci where community needs (as assessed by the community and local health providers), service planning and coordination (now undertaken by both PHOs and DHBs) and outcome requirements (generated primarily by the Ministry and overseen by DHBs), come together. The units should see themselves as advocates for their community, arranging and coordinating services to fit the unique needs of their population. They need to be acceptable to all provider groups and require discretionary income.

The creation of effective locality units requires reciprocal changes in existing bodies. DHB planning and funding divisions need to limit themselves to defining and monitoring outcomes while letting the locality units decide how these should be achieved. PHOs may sub-divide themselves to correspond to locality boards, while continuing to provide clinician education and back-office practice operations, at a district, or even regional level. Community services, whether provided by the DHB or by PHOs, need to be organised by locality.

For PHC to fulfil its potential in NZ, services must become more accessible, complete and coordinated, and need to be appropriately targeted for each locality. Well-targeted and coordinated services would use resources more effectively and can produce better outcomes without increasing cost.

*Dr Antony Raymont
Senior Research Officer, Waitemata
District Health Board, Auckland*

References

- MCNZ. The Medical Workforce in 2005. Wellington: Medical Council of New Zealand; 2009.
- Raymont A, Cumming J. Evaluation of the Implementation and Intermediate Outcomes of the Primary Health Care Strategy Third Report: Status and Activities of General Medical Practices Wellington: Health Services Research Centre; 2009.
- Raymont A, Cumming J, Gribben B, Boustead C. Evaluation of the Primary Health Care Strategy: Final Report. Wellington: Health Services Research Centre. Wellington: Health Services Research Centre; submitted 2011.
- Ryall H. Better, Sooner, More Convenient: Health Discussion Paper. Wellington: National Party of New Zealand; 2007.

Access-literacy gap in online health education for diabetes—Internet access is just one link

Online ‘web’ applications for diabetes health education hold potential for empowering patients with self-monitoring and feedback at their homes.¹ The cross-sectional telephone survey of 68 patients in Northland, New Zealand adds valuable contribution to this emerging area of research.² This pilot

study is useful to other parts of the world with indigenous subgroups experiencing rapid social change and a high incidence of diabetes, such as the United Arab Emirates with over 24% of the adult population affected.^{3,4} The authors highlight the gap between having Internet access at home and being able to use online applications effectively (‘Internet Literacy’) among low-literacy patients.

That patients with limited literacy can improve behaviours such as diet, exercise and medication adherence with Internet-based programmes was recently shown in a 12-month randomised controlled trial with 463 patients.⁵ Another trial recruiting 270 adults with diabetes found that literacy and ethnicity did not correlate with online engagement—a reassuring result for reaching minorities.⁶ Unfortunately, the effect size has been frustratingly small in terms of HbA1c control and other biomedical outcomes, and at times non-significant as in a smaller trial enrolling 70 adolescents with Type 1 diabetes.⁷

Further research should focus on design enhancements for patients with low literacy and different ethnic backgrounds. For example, websites should minimise log-in process (or use an open portal) and provide content on difficult-to-ask questions from local physicians with active discussion boards.⁸

Assistant Professor Muhammad Jawad Hashim

Department of Family Medicine, Faculty of Medicine and Health Sciences, UAE University, United Emirates Republic

References

- Kaufman N. Internet and information technology use in treatment of diabetes. *Int J Clin Pract Suppl.* 2010;(166):41–46.
- Reti SR, Feldman HJ, Safran C. Online access and literacy in Maori New Zealanders with diabetes. *J Prim Health Care.* 2011;3(3):190–191.
- Saadi H, Carruthers SG, Nagelkerke N, Al-Maskari F, Afandi B, Reed R, et al. Prevalence of diabetes mellitus and its complications in a population-based sample in Al Ain, United Arab Emirates. *Diabetes Res Clin Pract.* 2007;78(3):369–377.
- Baynoune LM, Revel AD, Nagelkerke NJ, Jaber TM, Omar AO, Ahmed NM, et al. High prevalence of the cardiovascular risk factors in Al-Ain, United Arab Emirates. An emerging health care priority. *Saudi Med J.* 2008;29(8):1173–1178.
- Glasgow RE, Kurz D, King D, Dickman JM, Faber AJ, Halterman E, et al. Twelve-month outcomes of an Internet-based diabetes self-management support program. *Patient Education and Counseling [Internet].* 2011 [cited 2011 Sep 29]. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21924576>
- Glasgow RE, Christiansen SM, Kurz D, King DK, Woolley T, Faber AJ, et al. Engagement in a diabetes self-management website: usage patterns and generalizability of program use. *J Med Internet Res.* 2011;13(1):e9.
- Landau Z, Mazor-Aronovitch K, Boaz M, Blaychfeld-Magnazi M, Graph-Barel C, Levek-Motola N, et al. The effectiveness of Internet-based blood glucose monitoring system on improving diabetes control in adolescents with Type 1 diabetes. *Pediatric Diabetes [Internet].* 2011 [cited 2011 Sep 29]. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21848925>
- Nordfeldt S, Hanberger L, Berterö C. Patient and parent views on a Web 2.0 Diabetes Portal—the management tool, the generator, and the gatekeeper: qualitative study. *J Med Internet Res.* 2010;12(2):e17.

GEMS OF NEW ZEALAND

Primary Health Care Research

A multi-stakeholder model of effectiveness for community pharmacy practice and research

International health policy reform calls for community pharmacy to engage as an effective provider within the primary care sector. Likewise, professional pharmacy bodies would like to see increased role extension and integration with other members of the wider primary care team. Despite this, there are few models which describe what an effective community pharmacy might look like under current policy reform. This paper reports the outcome of a multi-stakeholder concept-mapping exercise and outlines a preliminary model of effectiveness which will be able to inform performance indicator development for practice and research activities in the future.

Scahill SL, Harrison J, Carswell P. What constitutes an effective community pharmacy? Development of a preliminary model of organizational effectiveness through concept mapping with multiple stakeholders. *Int J Qual Health Care.* 2010;22(4):324–32. DOI: 10.1093/intqhc/mzq033. **Corresponding author:** Shane Scahill; email: s.scahill@auckland.ac.nz

Clinical medication review by community pharmacists

This New Zealand six-month randomised controlled trial indicated significant improvement in medication appropriateness for people over 65 years

old and on five or more medicines, if they received a clinical medication review by an accredited community pharmacist. Fifty-seven of 63 general practitioners who agreed to participate were exposed to the intervention of a community pharmacist undertaking a clinical medication review for one or more of their patients. A notable finding was the pharmacist withdrawal rate. Of 44 community pharmacists who agreed to participate, only 26 started the study, with only 17 (39%) completing the study and providing usable data. This highlights potential difficulties to providing clinical pharmacist services from a community pharmacy environment.

Bryant LJ, Coster G, Gamble GD, McCormick RN. The General Practitioner–Pharmacist Collaboration (GPPC) study: a randomised controlled trial of clinical medication reviews in community pharmacy. *Int J Pharm Pract.* 2011 Apr;19(2):94–105. DOI: 10.1111/j.2042-7174.2010.00079.x. **Corresponding author:** Linda Bryant; email: l.bryant@auckland.ac.nz

Rural hospital doctor workforce issues

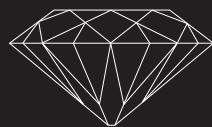
In 2009 the Medical Council approved a new vocational scope of practice in Rural Hospital Medicine (RHM). This study was designed to establish the current composition of the rural hospital medical workforce. It identified 28 rural hospitals and 107 medical practitioners providing clinical services. The work-

force was older (median age 47), predominantly male (75%), principally trained overseas (68%) with 54% vocationally registered (53% were general practitioners). We identified that 35% of hospitals had no recognised clinical leader nor an active process of credentialing. The findings quantify the shortage of medical practitioners and the governance issues facing small rural hospitals.

Lawrenson R, Nixon G, Steed R. The Rural Hospital Doctors Workforce in New Zealand. *Rural Remote Health.* 2011 Apr-Jun;11(2):1588. **Corresponding author:** Ross Lawrenson; email: Ross.Lawrenson@waikatodhb.health.nz

COPD self-management in New Zealand: patient attitudes and behaviours

Self-management of chronic obstructive pulmonary disease is central to decreasing exacerbations, preventing hospitalisation and improving health-related quality of life. Self-management is often complex and requires significant effort and commitment from patients. Many patients accept their condition with a sense of helplessness; this may undermine their motivation to engage in complex therapies. This New Zealand study interviewed 29 patients with moderate to severe COPD about helplessness and its consequences for self-management. They confirmed the presence of helplessness and poor self-management, but also



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found self-blame and limited social support amongst European patients, whereas faith and family were strongly expressed amongst Pacific patients.

Sheridan N, Kinealy T, Salmon E, Rea H, Raphael D, Schmidt-Busby J. Helplessness, self blame and faith may impact on self management in COPD: a qualitative study. *Prim Care Respir J.* 2011; 20(3):307–314.

Corresponding author: Nicolette Sheridan; email: n.sheridan@auckland.ac.nz

A qualitative exploration of the views of community pharmacists on providing alcohol health promotion interventions

With the recent developments in community pharmacy's public health role, pharmacies have been suggested as a promising site for screening and brief intervention activities to reduce alcohol consumption and harmful drinking patterns. But how do community pharmacists feel about these proposals? This paper explores the views of 40 pharmacists from England and New Zealand, with a focus on potential barriers and facilitators of service provision. The findings indicate potential for future development in this area, despite the identification of some less predictable barriers.

Horsfield E, Sheridan J, Anderson C. What do community pharmacists think about undertaking screening and brief interventions with problem drinkers? Results of a qualitative study in New Zealand and England. *Int J Pharm Pract.* 2011;19(3):192–200. **Corresponding author:** Emma Horsfield; email: ehor011@aucklanduni.ac.nz

Maori patients more likely to have anti-streptokinase antibodies

Anti-streptokinase antibodies were measured in acute coronary syndrome patients in three different NZ rural communities—Central Otago, Thames and the Hokianga. Patients in the

Hokianga were 2.5 times more likely to have a high antibody titre (38.2% vs 12.7% $p=0.0018$). This is not surprising given the high incidence of Group A streptococcal infection in rural NZ communities that are predominantly Maori. These antibodies may be neutralising and render the drug ineffective. This study provides support for the recent move away from streptokinase in favour of the new non-immunogenic fibrinolytic drugs. Issues remain for the Pacific Islands where streptokinase is still commonly used.

Nixon G, Blattner K, JDawson J, Dovey S, Black M, Wilkins G, Dunn A, McLellan A. Streptokinase antibodies in patients presenting with acute coronary syndrome in three rural New Zealand populations. *J Clin Pathol.* 2011;64:426–429. **Corresponding author:** Garry Nixon; email: garry.nixon@otago.ac.nz

New Zealand general practice nurses' roles in mental health care

To explore potential for primary mental health delivery, for those with mild to moderate mental health conditions, the Ministry of Health provided funds to Primary Health Organisations to organise models of care. The paper reports the various roles that nurses in general practice settings undertook. Depending on the model of care, the roles fell into two main groups: specialist nurses in newly created roles or practice nurses working within their generalist skill set. To enable the latter group to work to full capacity, structural, attitudinal and professional development barriers need to be addressed to offer an increased workforce.

McKinlay E, Garrett S, McBain L, Dowell T, Collings S, Stanley J. New Zealand general practice nurses' roles in mental health care. *Int Nurs Rev.* 2011;58(2):225–233. **Corresponding author:** Eileen McKinlay; email: Eileen.mckinlay@otago.ac.nz

How patients can tell if we care

By listening to the stories of people close to the end of life, these authors identified what patients thought care in a medical context is. By interviewing 13 patients and their family caregiver they were able to identify what those people thought was important for doctors to know about care. Connecting with the patient through rapport and touch, listening to both patient and carer and getting to know them all contributed. It may seem obvious but there are some lessons to be learned here. Uncaring behaviours were also identified.

Janssen A, MacLeod RD. What does care mean? Perceptions of people near the end of life. *Palliat Support Care.* 2010;8:433–440.

Corresponding author: Anna Janssen; email: anna.janssen@kcl.ac.uk

Does it matter to which hospital you go if you are dying?

Although this study is from Canada (with a NZ co-author), it may well have implications for practitioners and patients in other countries. Using hospital charts in two hospitals in one Canadian city, the researchers identified that only 29% of patients dying in a hospital without a palliative care (PC) team were referred to PC services. Surprisingly, in the other hospital (with a PC team) still only 68% were referred. Referral to PC at least in part depended on what hospital the patient was in. Patients who were older or who had non-cancer diagnoses had less access to services.

Cohen J, Wilson D, Thurston A, MacLeod R, Deliens, L. Access to palliative care services in hospital: a matter of being in the right hospital. Hospital charts study in a Canadian city. *Palliat Med.* 2011. DOI: 10.1177/0269216311408992. **Corresponding author:** Joachim Cohen; email: jcohen@vub.ac.be

ABOUT THE JOURNAL OF PRIMARY HEALTH CARE

The *Journal of Primary Health Care* (JPHC) began publishing in 2009, superseding the previous RNZCGP journal the *New Zealand Family Physician*. It is an interdisciplinary publication aimed at moving research into primary health care practice and practice into research. This includes the fields of family practice, primary health care nursing and community pharmacy as well as areas such as health care delivery, health promotion, epidemiology, public health and medical sociology of interest to a primary health care provider audience. It is positioned as relevant to countries within the Pacific rim.

JPHC publishes peer-reviewed quantitative and qualitative original research, systematic reviews, papers on improving performance and short reports that are relevant to its primary health care practitioners. For the aim, scope, instructions to authors and templates for publications see www.rnzcgp.org.nz/journal-of-primary-health-care/.

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JPHC publishes viewpoints, commentaries and reflections that explore areas of uncertainty on aspects of care for which there is no one right answer. Debate is stimulated in *Back to Back*, where two professionals present their opposing views on a topic. There is a regular *Ethics* column. *Letters to the Editor* are welcomed.

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Prof. Felicity Goodyear-Smith: Professor and Goodfellow Postgraduate Chair, Department of General Practice and Primary Health Care, The University of Auckland, Auckland, New Zealand; editor@rnzcgp.org.nz

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